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THIRTY-THIRD ANNUAL REPORT
OF THE
SECRETARY
OF THE
STATE BOARD OF HEALTH
OF THE
STATE OF MICHIGAN
FOR THE
FISCAL YEAR ENDING JUNE 30, 1905.



BY AUTHORITY

LANSING, MICHIGAN
WYNKOOP HALLENBECK CRAWFORD CO., STATE PRINTERS
1906

OFFICE OF THE
SECRETARY OF THE STATE BOARD OF HEALTH,
LANSING, MICHIGAN, DECEMBER, 1906.

To HON. FRED M. WARNER, *Governor of Michigan*:

SIR:—In compliance with the laws of this State, I present to you the accompanying report for the fiscal year ending June 30, 1905.

Very respectfully,

FRANK W. SHUMWAY,

Secretary of the State Board of Health.

396492

M E M B E R S
OF THE
MICHIGAN STATE BOARD OF HEALTH.

NAME.	POSTOFFICE ADDRESS.	TERM EXPIRES.
VICTOR C. VAUGHAN, M. D., Ph. D.....	Ann Arbor.....	January 31, 1907
AARON R. WHEELER, M. D.....	St. Louis....	January 31, 1907
CHARLES M. RANGER, A. B.....	Battle Creek....	January 31, 1909
HON. COLEMAN C. VAUGHAN,.....	St. Johns.....	January 31, 1909
ANGUS MCLEAN, M. D.....	Detroit.....	January 31, 1911
MALCOLM C. SINCLAIR, M. D.....	Grand Rapids.....	January 31, 1911
FRANK W. SHUMWAY, M. D.....	Lansing.....	March 30, 1911

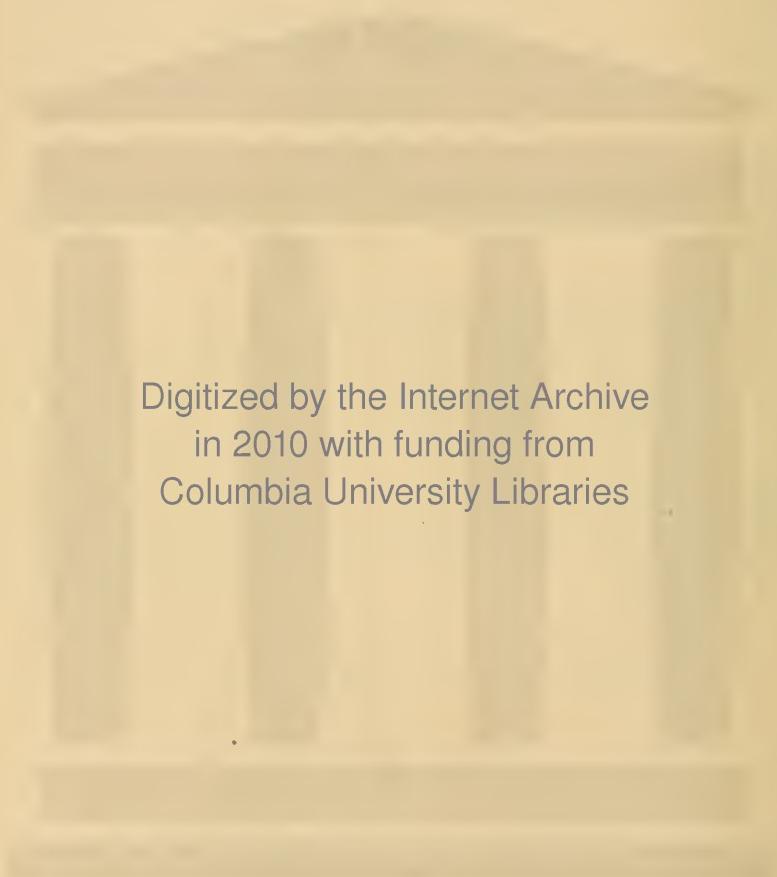
PRESIDENT,
VICTOR C. VAUGHAN, M. D.

VICE-PRESIDENT,
ANGUS MCLEAN, M. D.

SECRETARY AND EXECUTIVE OFFICER,
FRANK W. SHUMWAY, M. D.

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GENERAL REPORT.

PERSONNEL OF THE BOARD.

By a combination of circumstances, a very considerable change in the personnel of the Board has taken place since the publication of the last annual report.

The terms of office of Dr. Collins H. Johnston and Dr. D. A. MacLachlan having expired, Dr. Angus McLean and Dr. Malcolm C. Sinclair were appointed, by the Governor, in their place.

By the death of the Hon. Frank Wells, President of the Board, another vacancy occurred, and Hon. Coleman C. Vaughan was appointed, by the Governor, to fill out the unexpired term of Mr. Wells.

Still another vacancy was created by the resignation of Hon. Henry A. Haigh, and Dr. Aaron R. Wheeler was appointed, by the Governor, to fill out the unexpired term of Mr. Haigh.

By the enactment of the new law governing the appointment of the Secretary of this Board, printed on a subsequent page, a vacancy occurred in the office of Secretary, and the Governor appointed Dr. Frank W. Shumway Secretary of the Board for the six years ending March 30, 1911.

WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1905.

Aside from the work in committees and in connection with the office of the Secretary of the Board, the work of the State Board of Health itself has included that done at the Conference of Health Officials, that in connection with the examination of plans and specifications for proposed public buildings, the examination of persons to determine their qualifications for licenses to properly embalm and disinfect bodies dead of infectious and contagious diseases, and the work done at regular and special meetings of the Board.

REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD OF HEALTH, DURING THE FISCAL YEAR ENDING JUNE 30, 1905.

Up to and including the meeting of October 23, 1888, the minutes of all meetings of the Board were copied into the permanent record books in the office of the Secretary. From that time, to and including the proceedings of the meeting of May 13, 1898, the minutes were printed in the

annual reports of the Board. Commencing with the annual report for 1899, in accordance with the law of 1899, the volume was greatly reduced in size, being limited to 300 pages. Accordingly, mention only has been made in recent reports of the times and places of meetings, and the names of members present at each meeting, but a complete record of the meetings is kept in the office of the Secretary.

By reason of the usual articles on meteorology and sickness statistics not being printed in this report, a portion of the available space has been used for the printing of the most important items in the proceedings of each meeting of the Board, during the fiscal year, 1905.

REGULAR MEETING, HELD AT LANSING, JULY 8, 1904.

The members present were: Hon. Frank Wells, President; Victor C. Vaughan, M. D., Hon. Henry A. Haigh, Mr. Charles M. Ranger, D. A. MacLachlan, M. D., and Henry B. Baker, Secretary.

The President, having been absent from the State at the time of the annual meeting in April, gave his annual address to the Board at this time.*

Mr. Wells, having been instructed by the Board, at a former meeting, to prepare a manual for the use of health officers, submitted a copy to each member of the Board for their consideration.

Doctor Baker, as a delegate of this Board to attend the Conference of State and Provincial Boards of Health of North America, held at Washington, D. C., May 3, 1904, reported, verbally, on the meeting, and submitted to the Board a copy of preambles and resolutions offered by him, and adopted by the Conference, on the "Cheapest and best way to restrict smallpox."

Doctors Vaughan and Baker, delegates of this Board to attend the meeting of the American Medical Association, held at Atlantic City, N. J., June 7-10, 1904, made verbal reports on the meeting. Doctor Baker spoke of the very important consideration given the subject of venereal diseases, at the meeting of the Hygienic Section.

Doctor Baker then read a report showing what had been accomplished during the first six months of 1904 in the prevention of pneumonia. He also read a paper on the relation of preventable diseases to taxation, which, owing to the fact that the compilation on this subject had not been completed, preventing a detailed report, was not printed.

Doctor Vaughan offered the following preamble and resolutions, which were adopted:

WHEREAS, It is desirable that the efficiency of the clerical force in the office of the Michigan State Board of Health be kept at a high standard,

Resolved, That after this date, July 8, 1904, no one shall be appointed a clerk in the office without first passing a competitive examination to cover the English language (writing an essay of 200 words), the history of the United States and of the State of Michigan, arithmetic (including proportion and percentage), the geography of the United States and the State of Michigan, the fundamental principles of sanitary science, vital statistics, the civil government of Michigan, the public health laws of Michigan, and, for certain positions, stenography and typewriting.

Resolved, That no clerk in this department shall be promoted or receive increase in salary without passing an additional examination, the scope of which is determined by a committee of this Board. Previous industry, attention to business and good behavior will be taken into consideration.

*This address was printed in the annual report of this Board for 1904.

Resolved, That the first examination for clerkships be held in the office of the Board August 17, 1904.

Resolved, That ten days' notice, in writing, of each competitive examination, be given to every applicant.

Resolved, That a special committee of the Board be appointed to prepare for and hold such examination.

Resolved, That the Secretary be empowered to dismiss any clerk, at any time, without previous notice, for indolence, neglect of duty or insubordination.

The plans for the proposed metallurgical building at the Michigan College of Mines, at Houghton, and the proposed additions to the Home for the Feeble Minded and Epileptic, at Lapeer, were submitted to the Board for their examination.*

President Wells was appointed to represent this Board at a meeting of the American Public Health Association at Havana, to be held in December and January.

REGULAR MEETING, HELD AT LANSING, OCTOBER 14, 1904.

The members present were: Hon. Frank Wells, President; Hon. Henry A. Haigh, Charles M. Ranger and Henry B. Baker, Secretary.

Mr. Haigh, who represented the Board at the International Congress of Tuberculosis at St. Louis, October 3-5, reported verbally, and also submitted a written report of the meeting.

Doctor Baker, who was a delegate to attend the meeting of the International Congress of Arts and Sciences, held at St. Louis, Mo., gave a brief account of the discussions that occurred in the sections of the Congress that pertained to public health.

Mr. Ranger, delegate to the National Conference of Boards of Examiners of Embalmers, at St. Louis, Mo., made a verbal report, in which he stated, in part, that in but few States is the subject under the control of the State Board of Health, and that owing to the difference in rules of the different States, relative to the transportation of dead bodies, a committee was appointed by the conference to secure the passage of a National law that would provide for a uniformity of these rules.

The Secretary presented bills, which he suggested should be introduced at the next session of the legislature, relative to the following subjects: To amend Section 4452 of the Compiled Laws of 1897; to provide for the appointment of deputy health officers at summer resorts; to provide for an annual public meeting to create public funds for public health purposes, and to urge the necessity of a State Sanatorium for Consumptives.

A resolution was adopted authorizing the committee on legislation to draft a bill for an annual conference and school for health officers.

SPECIAL MEETING, HELD AT LANSING, NOVEMBER 16, 1904.

The members present were: Hon. Frank Wells, President; Hon. Henry A. Haigh, Charles M. Ranger, and Henry B. Baker, Secretary.

A circular was presented by the Secretary announcing the fact that the next meeting of the Fourth Pan-American Medical Congress would be held at Panama, in January, 1905, and Mr. Wells, by action of the

*The reports of the examination of plans for State buildings are on a subsequent page.

Board, was authorized to attend the same, as well as the meeting of the American Public Health Association, to be held at Havana, the following week.

REGULAR MEETING, HELD AT LANSING, JANUARY 20, 1905.

The members present were: Victor C. Vaughan, M. D., Hon. Henry A. Haigh, D. A., MacLachlan, M. D., Collins H. Johnston, M. D., and Henry B. Baker, M. D., Secretary.

The members, having learned of the sudden death of the President of the Board, Hon. Frank Wells. Doctor Vaughan was elected President pro tem., and spoke briefly of the very efficient work of the late President, in his connection with this Board.

The President pro tem. then proceeded to appoint a committee, consisting of all the members of the Board who were present, to draft suitable resolutions on the death of Mr. Wells.

Mr. Haigh, as chairman of the committee on legislation, stated that some of the members of the committee were anxious to get back to the old method of auditing and paying expenses incurred in the care of persons suffering from communicable diseases. He also stated that the members of the committee had expressed themselves as favorable to framing a new law, relative to the paying of such expenses. Doctor Baker stated that while the present law prevents "graft and excessive bills by physicians," it also stops the progress of public health work, for the reason that physicians will not act. He then submitted a bill that he had drawn on the subject, together with other bills pertaining to public health.

The Secretary presented and read his written report on the subject, "Relation of Preventable Sickness to Taxation," which was ordered printed.

The attention of the Board was called to the permanganate process of disinfection, which had been experimented with by some of the eastern boards of health, notably, the Maine State Board of Health, which had published a pamphlet on the subject, recommending that process of disinfection, as no heat is necessary and the gas is easily liberated.

During this meeting Doctor Vaughan was unanimously elected President of the Board, to fill the vacancy caused by the death of the Hon. Frank Wells.

Doctor Baker mentioned a movement (in which several railroads had become interested and were promoting) relative to a Railroad Inspection Bureau, the object of which was to establish better sanitary conditions of railroad coaches and depots, and to eliminate, as far as possible, the transportation of individuals suffering from contagious diseases. It was stated that the railroads would maintain the organization, but they desired the co-operation of this Board, and to that end Dr. Baker was instructed to make an investigation.

Mr. Haigh, chairman of the committee on resolutions on the death of the Hon. Frank Wells, presented the following resolutions, which were unanimously adopted:

WHEREAS, This Board learned with deep sorrow of the sudden and untimely death of Hon. Frank Wells, for fourteen years a member of this Board, and its President for twelve years; and

WHEREAS, The great services rendered to this Board by Mr. Wells, and through

it to the people of the State of Michigan, in the advancement of sanitation and public health, call for deepest gratitude, and also for some expression of appreciation more worthy and extended than can be embodied in any formal resolution; therefore

Resolved, That the Secretary of the Board be instructed to prepare a suitable memorial of these services, setting forth their character and great value, and embodying the fact that during the latter years of his life, Mr. Wells devoted practically his entire time to the advancement of the public health interests of the State, and that he labored efficiently in season and out, and all without thought of compensation or reward, for the good of his fellow men.

Resolved, That the Board extend its sympathy and condolence to the family of the deceased, and that a copy of these resolutions be suitably inscribed and sent to them.

Resolved, That as a mark of respect this Board attend the funeral of the deceased in a body.

Resolved, That as a further mark of respect, this Board do now adjourn.

SPECIAL MEETING, HELD AT LANSING, MARCH 16, 1905.

The members present were: Dr. Victor C. Vaughan, President; Hon. Henry A. Haigh, Mr. Charles M. Ranger, Malcolm C. Sinclair, M. D., Angus McLean, M. D., Hon. Coleman C. Vaughan and Henry B. Baker, Secretary.

Dr. Hartz, of Detroit, chairman of the committee of the State Medical Society on State Sanatorium for Consumptives, was given permission to make a few remarks on the subject of a State Sanatorium. He stated that he desired the endorsement of this Board to assist him in securing the passage of a bill, then before the legislature, providing for a State Sanatorium for Consumptives. The proposed bill was then endorsed by the Board.

SPECIAL MEETING, HELD AT LANSING, APRIL 5, 1905.

The following members were present: Hon. Henry A. Haigh, Malcolm C. Sinclair, M. D., Angus McLean, M. D., Hon. C. C. Vaughan, and Frank W. Shumway, M. D., Secretary.

Owing to the limited appropriation, provided for in the new law, for clerk hire, it became necessary to reduce the office force, and after careful deliberation, reductions were made in the clerkships where the most important work would be least handicapped.

A resolution was adopted relative to notifying the managers of the Soldiers' Home at Grand Rapids, to abate the nuisance of the discharge of sewage from the Soldiers' Home into Grand River, and to notify the local Board of Health of said city to investigate all other sources of contamination of the waters of Grand River.

Doctor Sinclair was appointed a committee to investigate and report to this Board on the present water supply of the city of Grand Rapids.

REGULAR MEETING, HELD AT LANSING, APRIL 14, 1905.

The members present were: Victor C. Vaughan, M. D., President; Hon. Henry A. Haigh, Mr. Charles M. Ranger, Malcolm C. Sinclair, M. D., Hon. C. C. Vaughan, Angus McLean, M. D., and Frank W. Shumway, M. D., Secretary.

This being the annual meeting, and customary for the President to deliver an address on this occasion, President Vaughan was called upon to address the Board. He stated that he had not prepared a written ad-

dress to be given at this time, owing to the short time that he had been President, but from his general knowledge of the work of the Board, he offered certain suggestions, part of which are as follows:

Doctor Vaughan urged the importance of the Board and its members making special efforts to assist in securing the passage of the bill providing for a State Sanatorium for Consumptives. Massachusetts, Pennsylvania, Missouri, Ohio, New Jersey, and Rhode Island were mentioned as some of the States that had established sanatoria for the treatment of consumptives, and Michigan should make some provision for the treatment of her consumptives. In this connection Doctor Vaughan also mentioned the importance of collecting reliable statistics on the geographical and class distribution of the disease. The financial condition of the patient was mentioned as an important phase of the question. He suggested that the main feature of the work of the Board for the next two years should be a special study of consumption and the collection of reliable statistics in an endeavor to ascertain a correct status of the disease in Michigan, and whether or not the disease is increasing or decreasing.

Doctor Vaughan advised the importance of continuing the work on the restriction of pneumonia. Deaths from this disease are rapidly increasing, and the causes and means of its spread are problems that this Board might properly consider. A continuance of the general routine was advised, but the work of the Board on consumption and pneumonia were particular problems that the Board should give attention.

Doctor Vaughan also suggested that if the Teachers' Sanitary Bulletins are to be continued, the subject matter of the same ought to be more carefully considered. The Bulletins are extensively used and distributed throughout the State, and the articles published should receive careful preparation. It was suggested that the Bulletins be made the official publication of the Board, and more widely distributed.

Doctor McLean stated that the editor of the Journal of the State Medical Society had suggested his willingness to devote one page of each issue to items contributed by members of this Board.

Doctor Sinclair said he did not agree with President Vaughan in his remarks, especially that portion relative to collecting statistics on certain phases of the prevalence of tuberculosis, and suggested that the matter of reporting those cases should be left to the family and attending physician.

In reply to Doctor Sinclair, President Vaughan stated that the attending physicians frequently failed to report their cases of consumption, and that this office receives many of its reports from the Division of Vital Statistics after the death of the patient.

In connection with the above discussion, Doctor McLean asked if it would not be well to apply directly to the attending physician for this information, but Doctor Vaughan thought that it would not, as there might be many cases duplicated, which could be avoided by the reports coming through the local health officer.

Doctors Vaughan and Shumway were appointed delegates to attend the Conference of State and Provincial Boards of Health, and the Conference of the State and Provincial Boards with the Public Health and Marine Hospital Service and the National Society for the Prevention of Tuberculosis, to be held at Washington, in May.

Doctor Sinclair, to whom was referred the matter of investigating the

water supply of the city of Grand Rapids, stated that the present supply is very imperfect, and that while bonds had been issued for the purpose of improving the water system, nothing had yet been done.

The following resolution, which was adopted by the local Board of Health of Grand Rapids, and sent to this Board for its concurrence, was unanimously adopted:

Resolved, That the Board of Managers of the Soldiers' Home at the city of Grand Rapids, State of Michigan, be requested by the State Board of Health of Michigan to abate the nuisance of discharge of sewage from said Soldiers' Home into Grand river. And that the local Board of Health of Grand Rapids be requested to investigate this and all other sources of contamination of the waters of Grand river tending to affect and jeopardize the health of the citizens of the said city of Grand Rapids, and to take such steps as are warranted by law to abate each and every nuisance, which, in their opinion, is a nuisance to public health as a result of such pollution of the waters of Grand river, and that a copy of this resolution be forwarded to the Board of Managers of the Soldiers' Home and also to the Grand Rapids Board of Health.

The following action was taken relative to licensed embalmers of other States:

Licensed embalmers of other States, making application for license in Michigan, shall be required to file their written application with the Secretary of this Board, and pay a fee of five dollars, and file with the Secretary of the Board, or the committee of the Board having the subject in charge, sufficient evidence to show that the requirements of the Board granting the license are equal to the requirements of this Board on this subject.

Doctor Vaughan was at this meeting elected President of the Board for the ensuing two years.

CONFERENCE OF HEALTH OFFICERS.

The Eighth General Conference of Health Officials in Michigan was held in Ann Arbor, June 1 and 2, 1905. The subjects to which particular attention was given were: "A Statement of the Objects of the Conference," by Victor C. Vaughan, M. D.; "Municipal Water Supplies," by Gardner S. Williams, C. E.; "The Status of Typhoid Fever at Escanaba," by Oscar C. Breitenbach, M. D.; "Report on the Sanitary Analyses of Drinking Water Made in the Hygienic Laboratory of the University of Michigan, from January 1, 1904, to June 1, 1905," by Prof. John F. Eastwood; "Report on the Year's Work in the Pasteur Institute, University of Michigan," by Thomas B. Cooley, M. D.; "Disinfection with Formaldehyde Saturated with Potassium Permanganate," by James G. Cummings, M. D.; "Modern Sanitation,"* by Malcolm C. Sinclair, M. D.; "The Benefits of a State Sanatorium for Tuberculosis,"* by Angus McLean, M. D.; "Organized Effort in Restricting Tuberculosis,"* by Thomas M. Koon, M. D.; "General Discussion on Tuberculosis," opened by Frank W. Shumway, M. D.; "The Heating and Ventilation of Residences,"* by John R. Allen, C. E.; "Restriction of Smallpox," by Thomas B. Cooley, M. D.; "The Milk Problem,"* by Guy L. Kiefer, M. D.; "Discussion of the Milk Problem," by Prof. Charles E. Marshall; "Street Flushing—the Most Rational Means of Abating the Dust Nuisance,"* by A. H. Coté, M. D.; "The Malarial Parasites of Birds," by

*These papers were printed in Teachers' Sanitary Bulletins, issued by this Department, from May to August, inclusive, 1905.

F. G. Novy, M. D.; "General Discussion on the Powers and Duties of Health Officers."

The discussions were valuable and interesting to any person who places an adequate estimate upon the value of human life, and especially to those in whose care public health interests are intrusted, i. e., the health officers. Papers were read and discussed by persons best fitted to offer suggestions upon the various topics assigned to them. Bacteriologists, practical sanitarians, statisticians, active medical practitioners and business men all combined to make this conference one of importance and value.

The conference was attended by many of the most efficient and conscientious local health officers and municipal bacteriologists, by the members of the State Board of Health, and by such of the general public as chose to attend.

EXAMINATION OF PLANS FOR STATE BUILDINGS, RELATIVE TO SEWERAGE, VENTILATION AND HEATING, DUR- ING THE FISCAL YEAR ENDING JUNE 30, 1905.

The following are reports upon the examination of plans submitted to this Board at the regular meeting at Lansing, July 8, 1904, in accordance with Section 2229, Compiled Laws of 1897:

PROPOSED NEW COTTAGE DORMITORY, AND ADDITIONS TO THE DINING ROOM BUILDING, AT THE MICHIGAN HOME FOR FEEBLE- MINDED AND EPILEPTIC, LAPEER.

No person was present to explain the plans, but some time previous to the meeting, Mr. Brundage, the Superintendent of Construction, called at the office of the Secretary and explained the proposed work.

Cottage Dormitory.

The cottage dormitory is to be a duplicate of a building constructed from the same set of plans which were examined by this Board at a special meeting held at Lansing, May 13, 1898.

The plans contemplate the heating of the cottage by indirect radiation, the fresh-air supply to be taken from rooms in the basement, properly prepared and set apart for that purpose. It was stated by Mr. Brundage that the vent flues are to be carried separately to the outer air.

In the first report of this Board on the examination of these plans, criticisms were made relative to some details in the sewerage and drainage, and those portions of the report relative to this subject are incorporated with this report, as follows:

"Partial provision is made for inlet ventilation to the sewer and soil pipes inside the building, by a four-inch iron pipe, extending from the house side of

the trap, which is shown to be just inside the foundation wall, to the outside of the veranda, but by the placing of traps on all the branch sewers from the soil pipes, the proper circulation of air through the sewer and soil pipes is rendered impossible.

"The use of five traps in the sewer under the basement floor is considered unnecessary, and objectionable, for the reason that they would prevent the free flow of sewage from the building and the circulation of air through the soil pipes, and would tend to frequent stoppages in the sewer.

"The proposed position of the open end of the fresh-air inlet pipe is not good, for the reason that with a discharge from a fixture inside the building foul air would be driven out of this pipe at a point in the veranda wall near where the inmates might be sitting or standing.

"For the purpose of overcoming the before-named objections, it is recommended that the five traps in the sewer under the basement and the 'back-water flap trap' in the main sewer be dispensed with, and that a manhole and self-cleansing trap be constructed at that point in the main sewer where it is proposed to place the 'back-water flap trap,' and that the top of the manhole be covered by an iron grating for the admission of air to the sewer. This arrangement would insure a movement of air through every part of the sewer, from the main trap to the top of the soil pipes, and no foul air would be discharged at the ground level in the immediate vicinity of the building by a reversal of the current of air in the sewer.

"The proposed method of connecting the rain conductors direct to the sewer is not approved, for the reason that foul air from the conductors might be discharged in the vicinity of upper windows.

"The proposed method of connecting the subsoil drains direct with the sewer is not approved, for the reason that foul air might escape through the open joints into the building, and in case of a stoppage, sewage might leak through the open joints into and contaminate the subsoil, inside and outside the building.

"It is recommended that the sewers from the rain conductors and the subsoil drains be conducted to a point near the suggested manhole and main trap, and connected to the sewer through a back-water valve and a trap with a deep seal. This would insure the subsoil drains against flooding from a stoppage in the main sewer, and preclude the passage of foul air from the sewer to the rain conductors.

"The position of the water closet in the basement, as shown by the plans, is not approved. It is recommended that it be placed near an outside wall so that light and ventilation may be obtained to the same."

Dining Room Building.

The proposed additions to the dining room building are to consist of north and south front wings, with dining rooms on the first floor, and sleeping rooms on the second and third floors. The same general plan of heating and ventilating the additions to the dining room will be observed as in the present building, plans for which were examined by this Board at a special meeting held at Detroit, Sept. 16, 1897. Modified portions of the previous report, relative to the heating and ventilation of the building, are therefore incorporated with this report, as follows:

The system proposed by the plans submitted, contemplates the heating of the dining rooms by means of direct-indirect radiators, placed under the windows in each room. A flue is to be placed in the wall immediately below each radiator, permitting the flow of outer air to the bottom of each radiator, the amount being governed by a "proper" apparatus connected with each flue, but the dimensions of these flues are not given. If the radiators will supply air sufficiently warm in the coldest weather at the rate of 2,000 cubic feet per hour for each occupant, the proposed method of heating will be considered satisfactory. It is recommended, however, that the indirect method of heating be used.

Flues for the removal of vitiated air are to be constructed in the front outer walls, and the two present vent flues in each dining room, which are now on outside walls, will be on inside walls and utilized for the ventilation of the new wings. It is recommended that all the flues be on inside walls, so that the draft in them will not be interfered with by the cool air outside. The plans for the present building contemplate the collection of all vent flues in the attic to a central flue. It is recommended that the proposed additional flues be carried separately to the outer air above the roof.

There is no apparent provision for the ventilation of the sleeping rooms on the second and third floors, and the heating of the rooms is to be by direct radiation. This is not approved; each room should have a supply of fresh air sufficient to afford at least 2,000 cubic feet of fresh air per hour for each occupant at all times, and a flue for the removal of an equal quantity of vitiated air, carried, on inside walls, separately to the outer air above the roof.

With the exceptions before mentioned, the plans were approved, in so far as this Board is required to examine and express an opinion.

PROPOSED NEW METALLURGICAL BUILDING FOR THE MICHIGAN COLLEGE OF MINES, AT HOUGHTON.

The plans contemplate the heating of the building by direct radiation, and by the plenum system, the fresh-air supply to be taken from outdoors and conducted to the fan in a concrete conduit just below the basement floor. All the distributing ducts and flues from the fan to the rooms are to be of galvanized sheet iron. This Board has not, in the past, approved of the fan system of heating and ventilation, for the reason that the system is costly and complicated, and requires skilled attendance, and for the important reason, that when the fan stops the ventilation also stops; but in the case of laboratory rooms, where the fumes from chemicals and the products of combustion from gas jets should be removed quickly, the Board has, in several such instances, approved its use for such rooms. As the proposed building, under consideration, will consist principally of laboratory rooms, and as it is probable the fan system would have expert and constant supervision, under the exceptional circumstances, the proposed system is approved.

No provision seems to have been made for the supply of fresh air to the Wet Laboratory and the Furnace Laboratory in the basement; the Special Work room, Professor's room, Grinding room, and Dark room on the first floor; and the Machine and Model room, Ore and Product room, and the two unassigned rooms on the second floor. It is recommended that provision be made for the supply of at least 2,000 cubic feet of fresh air per hour for each occupant of a room.

No provision seems to have been made for the removal of vitiated air from the Pyrometer room in the basement; the Special Work room, Professor's room, Grinding room, and Dark room on the first floor; and the Machine and Model room, Ore and Product room, and the two unassigned rooms on the second floor. It is recommended that proper and sufficient vent flues be provided for each occupied room.

The vents provided for the removal of vitiated air from the rooms in

the basement, and from the Coat room on the first floor, are shown to be at the ceiling. This is not approved, and it is recommended that all the vent registers be in the walls at the floor levels.

The following vent flues are on outside walls: *In the basement*, the Wet Laboratory, the Furnace Laboratory, and the Electrolytic Laboratory; *on the first floor*, in the Drawing room, Recitation room and Coat room; and *on the second floor*, in the Lecture hall. To prevent the cooling action of the outside air, and the consequent interference with the drafts in the flues, it is recommended that the vent flues be placed on or in inside walls in each case.

The basement plan shows the drain from the sink waste to be connected with the drain from the toilet room at right angles. This is not approved; the connection should be through a Y fitting.

On page 22 of the specifications which accompanied the plans it is provided that all the joints in the cast iron drains shall be made with Portland cement. This is not approved; the joints should be made with oakum and molten lead, properly caulked, as provided for the soil pipes.

The plumbing specifications, generally, seem to be in accordance with modern practice, and are approved.

With the exceptions before mentioned, the plans were approved, in so far as this Board is required by law to examine and express an opinion.

EXAMINATION AND LICENSING OF EMBALMERS.

Under the provisions of Act No. 132, Laws of 1903, two examinations were held during the fiscal year 1905, as follows:

Detroit, July 15, 1904, and
Lansing, November 16, 1904.

Of the 102 persons examined, 64 were granted licenses and awarded diplomas.

Upon proper showing being made to the Board in the matter of two licenses that had lapsed, new licenses were issued upon the payment of the required fee.

A statement of expenses incurred in the operation of Act No. 132, Laws of 1903, may be found on a subsequent page of this report.

GENERAL WORK, AND EXPENDITURES, IN THE OFFICE OF THE SECRETARY DURING THE FISCAL YEAR, 1905.

Much of the work of the office naturally groups itself under three heads,—the collection of information, the compilation of information so collected, and the dissemination of such information as will be of service in the restriction and prevention of disease.

COLLECTION OF INFORMATION.

As the local health officer is the principal medium by which this Department may reach and instruct the public in matters pertaining to the prevention of sickness and deaths, the appointment, and the return of the names and postoffice addresses of the health officers, in each year, are matters of more than ordinary interest and importance.

In each year, it is often necessary to make a first, second and third request for information which will place this office in communication with the local health officers, and during the time which is thus used up in corresponding and waiting, an outbreak of a dangerous disease may begin and become widespread before this office can afford the usual assistance to the proper officials in the locality.

It should be said, however, that there is an increasing tendency to comply with the law in this particular, and local boards of health now generally act promptly and co-operate cordially with this Department for the suppression of disease.

Having established communication with the newly appointed local health officers, pamphlets and other publications which may aid them in their work, together with the usual blanks for reports of outbreaks of diseases in their locality, are mailed from this Department. In some instances, considerable correspondence is necessary to instruct the health officials how to properly care for sick and infected persons, and to make reports which will be of value in the compilations for the annual reports and other publications of this Department.

COMPILATION OF INFORMATION.

For reasons stated in the summary relative to sickness statistics, and in the introduction to the article on Communicable diseases in Michigan, on subsequent pages of this report, some of the material collected in 1904 has not been compiled, and slight departures from the methods and ex-

tent of the compilations in former years, have been made in the compilation for this report.

DISSEMINATION OF INFORMATION.

PAMPHLET PUBLICATIONS.

As stated in the preceding paragraph, each newly appointed health officer is supplied, by this Department, with information relative to his duties. This information is contained principally in a pamphlet on the "Work of Health Officers," and in pamphlets covering the principal points in the etiology and methods of restriction and prevention of each of the dangerous communicable diseases.

Upon the receipt of information relative to an outbreak of a dangerous communicable disease, in addition to the usual instructions and blanks for making the reports, there are mailed to the health officer a sufficient number of pamphlets, relative to the particular disease then present, for distribution to the families and immediate neighbors of the sick person. In this way, the people are educated as to their duty, under the law, and their co-operation with the local health officers often secured.

A pamphlet covering the law respecting nuisances, and containing information relative to their suppression, is published, and distributed among those persons directly interested, when a complaint of a nuisance is made to this Department.

A pamphlet, giving the law, and regulations of this Department, respecting the preparation and shipment of dead bodies, is published, and distributed among the licensed embalmers, railroad officials, and other persons interested in the transportation of the dead.

ANNUAL REPORTS.

About 3,000 copies of the annual reports are published each year, and about 2,500 copies are distributed, immediately after publication, among the local health officials of this State, some local health officials in other states and countries, and the Secretaries of State and Provincial boards of health; and, in exchange, to the leading sanitary journals in this and other countries, and the principal libraries in the United States.

NEOSTYLE WORK.

An important method of disseminating information, which has been used very extensively by this Department, is the preparation, by the Rotary Neostyle, from time to time as occasion requires, of short articles, letters, etc., upon subjects of interest to the public, and their distribution to editors of newspapers in this State, to the leading sanitary journals, and to any person who may be especially interested, or who will print or use them for the benefit of others.

During the fiscal year 1905, Neostyle work to the amount of 20,154 impressions was prepared, and a large portion of it mailed as soon as

prepared. The principal subjects were: Proceedings of regular and special meetings of the State Board of Health; Bulletins of "Health in Michigan;" "Warning to Parents and Dealers in Pistols and Cartridges;" "What is the cheapest and best way to restrict smallpox;" Letters to licensed embalmers relative to renewal of licenses, date of examinations, etc.; Letters to Commissioners and Superintendents of schools asking for lists of teachers; "Ten millions of dollars for consumption hospitals in Germany;" "Who should pay local quarantine expenses;" "An enormous waste of money as well as of life;" Letter relative to public assemblies, holding church services, schools, etc.

The bulletins of "Health in Michigan" were discontinued in April, 1905.

TEACHERS' SANITARY BULLETINS.

The Teachers' Sanitary Bulletin is now in its eighth volume. These Bulletins are designed, principally, to enable the teachers in the public schools of the State to comply with the provisions of Act 146, Laws of 1895, and are sent gratuitously to all teachers whose names and addresses are obtained.

During the fiscal year 1905, aside from a number of shorter articles, and items relating to various phases of public health work, the following articles appeared in the Bulletins:

"Summer Diarrheas of Infancy, and Their Prevention," by Victor C. Vaughan, M. D., (July, 1904); "The Pasteur Treatment for Hydrophobia," by Thomas B. Cooley, M. D., (July, 1904); "Prolonging the Productive Period," by Hon. Henry A. Haigh, (August, 1904); "The Medical Inspection of Schools," by Helen McMurchy, M. D., (September, 1904); "The Value of Local Sanatoria in the Combat of Tuberculosis in Large Centers of Population," by S. A. Knopf, M. D., (November, 1904); "A Lesson in Bovine Tuberculosis," by H. L. Russell, (December, 1904); "Dust Infection, and Preliminary Description of Dust Disease," by Robert Hessler, M. D., (February, 1905); "Review of Recent Typhoid Fever Epidemics and Their Lessons," by S. R. Towne, (March, 1905); "The Relation of Preventable Diseases to Taxation," by Henry B. Baker, M. D., (April, 1905); "Modern Sanitation," by Malcolm C. Sinclair, M. D., (May, 1905); "Organized Effort in the Prevention of Tuberculosis," by Thomas M. Koon, M. D., (May, 1905); "The Milk Problem," by Guy L. Kiefer, M. D., (June, 1905); "Flushing the Streets—the Most Rational Method of Abating the Dust Nuisance," by A. H. Côté, M. D., (June, 1905).

WARNINGS TO HEALTH OFFICERS RELATIVE TO IMMIGRANTS, POSSIBLY EXPOSED TO DANGEROUS COMMUNICABLE DISEASES, DESTINED TO SETTLE IN MICHIGAN.

During the fiscal year 1905, two notices were received from the U. S. Commissioner of Immigrants at Philadelphia, Pa., and fourteen from the Dominion Immigration officers, Canada, relative to the occurrence of dangerous communicable diseases on board steamships prior to their arrival at United States and Canadian ports.

These notices gave the names and destinations of immigrants on board intending to settle in Michigan; and copies of these notices, in-

cluding the lists of the names of the immigrants, were made on blanks, designed in this office for this purpose, and promptly sent from this office to the health officer of the jurisdiction where the immigrants intended to settle. The purpose of such action is to aid the health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years, while these measures have been in use, very few outbreaks have been traced to immigrants.

FINANCIAL STATEMENTS.

By reason of the change in the office of Secretary, and the changes in the law, quoted on a subsequent page, by which the several appropriations for this Board were consolidated and the total amount changed, separate statements of expenditures for the periods prior to and subsequent to the changes in the law have been rendered necessary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER ACTS 81, 1873, 241, 1881, AND 140, 1901), UP TO MARCH 16, 1905.

Expenses of members:	
Attending meetings.....	\$88 12
Other official.....	196 77
Instruments and books.....	116 16
Paper, stationery, etc.....	190 44
Postage.....	1,578 60
Printing and binding.....	914 51
Secretary.....	2,116 70
Special investigations.....	3 75
Expressage.....	22 70
Telegrams.....	7 35
Telephone.....	34 71
Miscellaneous.....	64 19
Total expenditures.....	\$5,334 00
Unexpended balance turned over to State Treasurer.....	2,666 00
Amount of appropriation.....	\$8,000 00

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH, (UNDER ACT 142, 1897), UP TO MARCH 16, 1905.

Instruments and books.....	\$77 75
Paper, stationery, etc.....	549 78
Printing and binding.....	552 13
Expressage.....	4 13
Telephone.....	5 30
Miscellaneous.....	4 89
Total expenditures.....	\$1,193 98
Unexpended balance turned over to State Treasurer.....	1,306 02
Amount of appropriation.....	\$2,500 00

EXPENDITURES ON ACCOUNT OF THE BOARD.

Note.—The appropriations (\$10,500.00) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the annual report, or the expenses in the examination of plans for public buildings; those expenditures *on account of*, but not by the Board, are provided for by other acts of the legislature than those appropriating money to be expended by the Board; and the accounts are kept in other offices, not in the

office of the State Board of Health. The accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for the publication of the annual report of this Board, and in the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that board.

Respectfully submitted,
HENRY B. BAKER,
Secretary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER PUBLIC ACT NO. 18 OF 1905), SINCE MARCH 16, 1905.

Expenses of members:

Attending meetings.....	\$82 21
Other official.....	122 26
Engraving, drawing, etc.....	31 05
Instruments and books.....	17 00
Paper, stationery, etc.....	470 27
Postage.....	600 00
Printing and binding.....	396 10
Secretary.....	631 97
Special investigations.....	45 59
Expressage.....	11 23
Telegrams.....	4 17
Telephone.....	14 93
Miscellaneous.....	35
Total expenditures.....	\$2,427 13
Unexpended balance turned over to State Treasurer.....	197 87
Pro rata of appropriation.....	\$2,625 00

Note.—Pro rata of the appropriation (\$9,000.00) at the disposal of the State Board of Health for certain specified purposes, not including clerk hire, or the expenses in the examination of plans for public buildings; those expenditures *on account of*, but not by the Board, are provided for by other acts of the legislature than those appropriating money to be expended by the Board; and the accounts are kept in other offices, not in the office of the State Board of Health. The accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted,
F. W. SHUMWAY,
Secretary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER SECTION 7 OF ACT 132, LAWS OF 1903), EMBALMERS' FUND, AS ALLOWED DURING THE FISCAL YEAR, 1905.

RECEIPTS.	DISBURSEMENTS.
Fees from applicants for license and for renewals of licenses..... \$865 00	Expenses of members: Attending meetings..... \$55 54 Other official..... 41 90 Paper, stationery, etc..... 22 83 Postage..... 102 00 Printing and binding..... 55 30 Expressage..... 4 57 Telephone..... 5 00 Engraving, drawing, etc..... 17 25 Compensation of extra clerks..... 517 58 Fees returned to applicants..... 10 00 Miscellaneous..... 32 35 Unexpended balance, turned over to State Treasurer..... 68
Total receipts..... \$865 00	Total disbursements..... \$865 00

PUBLIC HEALTH LEGISLATION IN MICHIGAN IN 1905.

During the legislative session of 1905, the following public acts, relating to public health work, were passed and approved.

Changes in the laws are indicated by underlines.

ACT NO. 18, PUBLIC ACTS OF 1905.

An Act to amend sections four, five, six and seven of act number eighty-one of the Public Acts of eighteen hundred seventy-three, being "An act to establish a 'State Board of Health,' to provide for the appointment of a 'Superintendent of Vital Statistics,' and to assign certain duties to local boards of health," said sections being sections four thousand four hundred, four thousand four hundred one, four thousand four hundred two and four thousand four hundred three of the Compiled Laws of eighteen hundred ninety-seven, and to repeal act two hundred forty-one of the Public Acts of eighteen hundred eighty-one, act one hundred forty-two of the Public Acts of eighteen hundred ninety-seven, act one hundred forty of the Public Acts of nineteen hundred one, and all other acts or parts of acts inconsistent with the provisions of this act.

The People of the State of Michigan enact:

SECTION 1. Sections four, five, six and seven of act number eighty-one of the Public Acts of eighteen hundred seventy-three, entitled "An act to establish a 'State Board of Health,' to provide for the appointment of a 'Superintendent of Vital Statistics,' and to assign certain duties to local boards of health," said sections being sections four thousand four hundred, four thousand four hundred one, four thousand four hundred two and four thousand four hundred three of the Compiled Laws of eighteen hundred ninety-seven, are hereby amended to read as follows:

SEC. 4. At the meeting of the legislature in the year nineteen hundred five and every six years thereafter, the Governor, with the consent of the Senate, shall appoint a suitable and competent person to be the seventh member of the board, which member shall be the secretary of the said board, and its executive officer.

SEC. 5. Said secretary shall hold his office for six years and until his successor is appointed. He shall keep his office at Lansing, and shall perform the duties prescribed by this act, or required by the board. He shall keep a record of the transactions of the board; shall have the custody of all books, papers, documents and other property belonging to the board, which may be deposited in his office; shall, so far as practicable, communicate with other state boards of health, and with the local boards of health within this state; shall keep and file all reports received from such boards, and all correspondence of the office appertaining to the business of the board. He shall, so far as possible, aid in obtaining contributions to the library and museum of the board. He shall prepare blank forms of returns and such instructions as may be necessary, and forward them to the clerks of the several boards of health throughout the state. He shall collect information concerning vital statistics, knowledge respecting diseases, and all useful information on the subject of hygiene, and through an annual report, and otherwise, as the board may direct, shall disseminate such information among the people: Provided, That all printing and binding under the provisions of this act, shall be ordered through the Board of State Auditors, as other state printing is ordered and paid, except that the payment therefor shall be out of the appropriation provided for in section seven of this act.

SEC. 6. The secretary shall receive an annual salary of two thousand five

hundred dollars. The members of the board shall receive no per diem compensation for their services, but their traveling and other necessary expenses while employed on the business of the board, shall be allowed and paid.

SEC. 7. The sum of nine thousand dollars per annum, or so much thereof as may be deemed necessary by the State Board of Health, is hereby appropriated to pay the salary of the secretary, meet the contingent expenses of his office, and the expenses of the board, to pay for necessary instruments, to pay for special investigations, to pay for the compiling, publishing and distribution of such circulars and pamphlets as will promote the best interests of the public health, to comply with the provisions of section four thousand seven hundred ninety-six of the Compiled Laws of one thousand eight hundred ninety-seven, and to generally promote the public health. All expenses incurred under the provisions of this act shall be certified by the secretary of the board to the Board of State Auditors and allowed by them. The sum so allowed shall be paid from the state treasury on the warrant of the Auditor General and charged to the appropriation account of said board of health. And not to exceed ten thousand dollars shall be expended by said board of health in any one year for the employment of additional clerks in the office of said board, under the provisions of act number one hundred seventy-three of the Session Laws of eighteen hundred seventy-one, entitled "An act to provide for the payment of the salaries of the state officers," being section one hundred sixty-five of the Compiled Laws of eighteen hundred ninety-seven.

SEC. 2. Act two hundred forty-one of the Public Acts of eighteen hundred eighty-one, being sections four thousand four hundred eight and four thousand four hundred nine of the Compiled Laws of eighteen hundred ninety-seven, act one hundred forty-two of the Public Acts of eighteen hundred ninety-seven, being sections four thousand seven hundred ninety-eight and four thousand seven hundred ninety-nine of the Compiled Laws of eighteen hundred ninety-seven, act one hundred forty of the Public Acts of nineteen hundred one, and all other acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

This act is ordered to take immediate effect.

Approved March 16, 1905.

ACT NO 318, PUBLIC ACTS OF 1905.

AN ACT to authorize the appointment of an assistant secretary of the State Board of Health; to prescribe his duties and fix his compensation.

The People of the State of Michigan enact:

SECTION 1. The secretary of the State Board of Health is hereby authorized to appoint an assistant secretary of said board, which appointment may be revoked at his pleasure.

SEC. 2. It shall be the duty of such assistant secretary to perform such duties in connection with the department of the State Board of Health as may be assigned to him by the secretary, and during the illness, absence or disability of the secretary he may execute all the duties of that office. He shall be paid the sum of fifteen hundred dollars per annum, from the same fund and in the same manner as deputies in the different State departments are now paid.

This act is ordered to take immediate effect.

Approved June 17, 1905.

ACT NO. 254, PUBLIC ACTS OF 1905.

An Act to establish a State Sanatorium in some suitable locality in Michigan, for the care and treatment of persons having tuberculosis, and making appropriations therefor, and to provide a tax to meet the same.

The People of the State of Michigan enact:

SECTION 1. That a state sanatorium for the care and treatment of tuberculous persons, in some suitable locality in Michigan be and hereby is established.

SEC. 2. The Governor shall appoint six citizens of this state, four of whom shall be legally registered physicians, who shall constitute the board of trustees of the State Sanatorium. The term of office of each trustee shall be six years, the terms of two members of such board expiring every two years. To effect such order of expiration of term of office, the first appointment shall be made for the respective terms of two, four, and six years. Thereafter there shall be appointed by the Governor, with the consent of the Senate, two members every two years. Any such trustee may be removed by the Governor for such cause as the Governor may deem sufficient, after an opportunity to be heard in his own defense has been granted him. Any vacancy arising in said board by reason of removal, accepted resignation, or by death, shall be filled for the unexpired term by appointment in like manner as in the first instance. A majority of the board shall constitute a quorum, but no business shall be transacted except by the affirmative vote of at least three members of said board.

SEC. 3. For the purpose of this act, the board of trustees and their successors in office shall be a body corporate, with all the powers necessary to carry into effect this act.

SEC. 4. Said board of trustees shall have the general control of the property and affairs of the Sanatorium, and shall take such action as shall be necessary to carry out the purposes of this act.

SEC. 5. The board of trustees shall appoint a medical superintendent, not a member of said board, who shall be a legally qualified physician, of at least six years' experience in the practice of his profession, and who shall be chosen with a special view to his professional and executive ability. Such medical superintendent shall, in all matters pertaining to the Sanatorium, be under the general supervision of the board of trustees, who may remove him at any time and appoint his successor.

SEC. 6. Said board of trustees shall elect from the members a president, and shall appoint a secretary, and a treasurer. The treasurer shall give a bond to the people of the state of Michigan for the faithful performance of his trust, in the penal sum of twenty-five thousand dollars, to be approved by the Governor and filed with the Secretary of State. Said secretary or treasurer may at any time be removed, and his successor appointed, by the Governor on the recommendation of said board of trustees in its discretion.

SEC. 7. The medical superintendent, with the consent of the board of trustees, shall appoint such other officers, assistants and employees in and for the sanatorium as may be, from time to time, necessary to carry into effect this act: Provided, however, That all medical officers shall be well educated physicians. All such officers, assistants and employees shall be under the direct supervision of the medical superintendent, and may be removed by him. In case of removal by the medical superintendent of any such officers, assistant or employees, said medical superintendent shall forthwith report the same to the said board of trustees.

SEC. 8. The board of trustees shall, from time to time, determine the salaries and allowances of the officers, assistants and employees of said Sanatorium: Provided, That the salary of said medical superintendent shall not exceed the sum of two thousand dollars annually.

SEC. 9. The board of trustees is hereby directed to establish such by-laws as it may deem necessary and expedient for defining the duties of officers, assistants and employees, for fixing the conditions of admission, support and discharge of patients, and for conducting in a proper manner the professional and business affairs, also to ordain and enforce a suitable system of rules and regulations for the internal government, discipline and management of the Sanatorium.

SEC. 10. The board of trustees shall have authority, and it is hereby made the duty of said board on behalf of the state to receive by gift or grant, real estate consisting of state tax homestead lands as a site for said Sanatorium: Provided, That said lands are situated in some county of this state where the conditions are most favorable for the treatment of persons afflicted with tuberculosis. Said board shall have power to receive and hold property or money as endowment or otherwise for said Sanatorium, or to purchase a site and to cause to be erected thereon suitable buildings for said Sanatorium and to provide for the equipment of said buildings. If the said board can find a suitable tract of state tax homestead land upon which to erect said institution, consisting of any number of acres, the Commissioner of the State Land Office shall withdraw and withhold from said entry and sale said tract of lands subject to control and disposition of his department and to convey the same by deed of the Commissioner of the Land Office to said board of trustees as a site for said Sanatorium. The trustees shall have power to make all contracts and employ all agents necessary to carry into effect this act.

SEC. 11. Said board shall meet at the Sanatorium at least semi-annually, at which time a written report of the affairs and conditions of the Sanatorium and of the patients therein, to be prepared by the medical superintendent, shall be submitted to and carefully examined by the board. The board shall at such meetings personally inspect the Sanatorium, and shall examine and audit all bills and accounts. At the annual meeting, which shall be held in July, the board of trustees shall make a detailed report and shall examine the report and audit the accounts of the treasurer, which shall be presented at said annual meeting, and shall transmit it with their annual report to the Governor, for publication by the Board of State Auditors.

SEC. 12. The board of trustees shall receive no compensation for their services, but expenses incurred in the performance of their duties shall be audited by the board of trustees, certified by the president and secretary, and paid by its treasurer.

SEC. 13. The medical superintendent shall be chief executive officer of the Sanatorium. He shall have general superintendence of the buildings, grounds, furniture, fixtures, and stock, and the direction and control of all persons therein, subject to the by-laws and regulations established by the board of trustees. He or his representative shall daily ascertain the condition of each and all the patients, and prescribe or direct their treatment. He shall cause full and fair records of all his official acts and the entire business and operation of the Sanatorium to be kept regularly, from day to day, in books provided for that purpose, in the manner and to the extent prescribed in the by-laws, and he shall see that all the accounts and records are fully made up to the last day of June and present the same to the board of trustees at their annual meeting. It shall be the duty of the medical superintendent to admit any of the board of trustees into every part of the Sanatorium, and to exhibit to him or them, on demand, all the books, papers, accounts, and writings belonging to the Sanatorium, or pertaining to its business, management, discipline, or government; also to furnish copies, abstracts, and reports whenever required so to do by said board. The medical superintendent shall make, in a book kept for that purpose, at the time of reception, a record, with the date of the same, of the name, age, residence, occupation and such other statistics in regard to every patient admitted to the Sanatorium as the by-laws may require.

SEC. 14. The treasurer shall have the custody of all moneys, bonds, notes, mortgages, and other securities and obligations to the Sanatorium. Said moneys shall be disbursed only for the uses and purposes of the Sanatorium, and in the manner prescribed by the by-laws on itemized vouchers allowed by the board of trustees, and so certified by the president and secretary of the board. The treasurer shall keep full and accurate accounts of all receipts and payments, in the manner directed in the by-laws, and such other accounts as the board of trustees shall prescribe. He shall render statements of accounts of the several books, and of the funds and other property in his custody, whenever required so to do by the board of trustees. He shall have all accounts and records pertaining to his office fully made to the last day of June and present the same to the board of trustees at their annual meeting.

SEC. 15. There shall be received into said Sanatorium, such persons as shall be proved by proper bacteriological or clinical examination to be suffering from tuberculosis. Such patients shall be of two classes, namely, first, persons resi-

dent of this state who on account of their poverty are unable to pay the necessary expenses for residence at said Sanatorium; and second, residents of this state who are able to pay such fees as shall be fixed by the board of trustees.

SEC. 16. In case of any person designated in section fifteen under the first class, after such persons shall have furnished a certificate of the superintendent of the poor of their county or township, approved by the judge of probate of said county, that such person belongs in said first class, the board of trustees shall have discretionary power to pay their necessary expenses, not less than five dollars nor more than seven dollars per week, and may issue a voucher properly itemized and sworn to the Auditor General that such amount has been expended for the benefit of such person, whereupon the Auditor General shall draw his warrant on the State Treasurer therefor, and any such sums are hereby appropriated, and shall be paid out of any moneys in the general fund not otherwise appropriated, and the Auditor General shall charge all such money to the county of which such person is a resident or to which he or she belongs, to be collected quarterly and returned to the general fund in the State Treasury.

SEC. 17. Any superintendent of the poor, in any county of this state, may send, or cause to be sent, with the approval of the judge of probate of said county, to the Sanatorium any person who, under the rules of the Sanatorium, is entitled to admission therein, who is a charge upon the county. Before sending any patient to the Sanatorium, under the provisions of this act, such superintendent of the poor shall correspond with the superintendent of the Sanatorium, and conform to the rules established by the board of trustees, and he shall cause the patient to be comfortably clothed, and shall provide the patient with suitable clothing while the patient remains at the Sanatorium, and shall defray the necessary traveling expenses in going to and returning therefrom, and provide the patient with such articles of necessity and convenience as are required by the rules of the Sanatorium.

SEC. 18. All persons entitled to admission to the Sanatorium who are not a charge upon the county, but who, on account of their poverty, are unable to provide themselves with suitable clothing or other necessary articles, shall receive the same aid from the superintendent of the poor of their respective counties while attending the Sanatorium as is provided in this act for those who are a county charge. All proper expenses incurred by the superintendents of the poor under this or the preceding section shall be a charge against their respective counties, and shall be defrayed out of the poor fund of such county.

SEC. 19. The charges for the support of the patients in said Sanatorium who are able to pay the same, or have persons or kindred bound by law to maintain them, shall be paid to the medical superintendent by such patients, persons, or kindred, at a rate to be determined by the board of trustees of said Sanatorium.

SEC. 20. All moneys collected by the medical superintendent shall be passed over to the treasurer of the Sanatorium and his receipt taken therefor, such moneys to be disbursed by the treasurer under the provisions of section fourteen of this act.

SEC. 21. The sum of twenty thousand dollars is hereby appropriated for the fiscal year ending June thirty, nineteen hundred six, for the purpose of purchasing a site, of erecting, constructing and equipping the Sanatorium and buildings herein provided for, and to pay the necessary expenses of the members of the board of trustees and for the maintenance of the Sanatorium provided for in this act. The Treasurer of the state shall, on the warrant of the Auditor General and on the statement of the architect and of the board of trustees, pay over to the treasurer of the said Sanatorium the above named sum in such amounts as may from time to time in the judgment of the architect and board of trustees be deemed necessary.

SEC. 22. The sum of ten thousand dollars is hereby appropriated for the fiscal year ending June thirty, nineteen hundred seven, to pay the necessary expenses of the members of the board of trustees and for the maintenance of the Sanatorium provided for in this act. The treasurer of the state shall, on the warrant of the Auditor General and of the board of trustees pay over to the treasurer of the said Sanatorium the above named sum in such amounts as may, from time to time, in the judgment of the board of trustees, be deemed necessary.

SEC. 23. The Auditor General shall add to and incorporate in the state tax

for the fiscal year ending June thirty, nineteen hundred five, the sum of twenty thousand dollars, and for the fiscal year ending June thirty, nineteen hundred six, the sum of ten thousand dollars, which, when collected, shall be credited to the general fund to reimburse the same for the money hereby appropriated.

This act is ordered to take immediate effect.

Approved June 16, 1905.

ACT NO. 330, PUBLIC ACTS OF 1905.

AN ACT to provide for the immediate registration of births and the requiring of certificates of births.

The People of the State of Michigan enact:

SECTION 1. All births that occur in the State shall be immediately registered in the districts where they occur, which primary registration districts shall be the same as those provided for the registration of deaths by act number two hundred seventeen of the public acts of eighteen hundred ninety-seven, as amended by acts number twenty, and two hundred nine of the public acts of nineteen hundred one. Local registrars for deaths shall also be the local registrars for births, and the Secretary of State shall be the State registrar for births, as for deaths. Village and city registrars shall, immediately after qualification, designate deputy registrars to act in case of their illness or absence. It shall be the duty of the attending physician or midwife to file a certificate of birth, properly and completely filled out with all the particulars required by this act, with the local registrar of the district in which the birth occurred, within ten days after the date of birth. And if there be no attending physician or midwife, then it shall be the duty of the father of the child, householder, manager or superintendent of public or private institution, or other competent person having cognizance of the facts, to file said certificate of birth with the local registrar within ten days after birth.

SEC. 2. The certificate of birth shall contain the following items:

First. Place of birth, including State, county, township, village or city. If in a city, the ward, street and house number. If in a hospital or other institution, the name of the same to be given instead of the street and house number;

Second. Full name of child. If the child dies without a name before the certificate is filed, then the words "died unnamed" shall be entered. If the living child has not been named at the date of filing the certificate of birth, the space for "full name of child" is to be left blank, to be filled out subsequently by a special return of given name of child as hereinafter provided;

Third. Sex of child;

Fourth. Whether a twin, triplet or other plural birth. A separate certificate shall be required for each child in a case of plural birth;

Fifth. Whether legitimate or illegitimate;

Sixth. Full name of father;

Seventh. Residence of father;

Eighth. Color or race of father;

Ninth. Birthplace of father;

Tenth. Age of father at last birthday, in years;

Eleventh. Occupation of father;

Twelfth. Maiden name of mother, in full;

Thirteenth. Residence of mother;

Fourteenth. Color or race of mother;

Fifteenth. Birthplace of mother;

Sixteenth. Age of mother at last birthday, in years;

Seventeenth. Occupation of mother;

Eighteenth. Number of child of this mother;

Nineteenth. Number of children of this mother now living;

Twentieth. Certificate of physician attending or midwife as to attendance at birth, including statement of year, month, day and hour of birth. This certificate shall be signed by the attending physician or midwife, with date of signature and address. If there was no physician or midwife in attendance, then

the father, householder, manager or superintendent of public or private institution, or other competent person whose duty it shall become to file the certificate of birth as provided in section one of this act, shall draw a line through the words "I hereby certify that I attended the birth of above child," and shall write in lieu thereof the words "No physician or midwife," filling out the remainder of the certificate in regard to the year, month, day and hour of birth, and signing the certificate as father, householder, owner of premises, manager or superintendent of institution, as the case may be, with his address;

Twenty-first. Exact date of filing in office of local registrar, attested by his official signature, and registered number of birth as hereinafter provided.

The certificate shall be written legibly in permanent black ink, and no certificate shall be held to be complete and correct that does not supply all of the items of information specified above, if possible to obtain them, or satisfactorily account for the omission of any of said items.

SEC. 3. The local registrar shall supply blanks and instructions, as directed by the Secretary of State, to physicians, midwives, and to other persons requiring them. He shall carefully examine each certificate of birth when presented for record to see that it has been made out in accordance with the provisions of this act, and the instructions of the Secretary of State, and if any certificate is incomplete or unsatisfactory, he shall immediately notify the informant and require him to supply the missing items if they can be obtained. If it is impossible to obtain any such item, then the local registrar shall fill the blank space with the word "Unknown." When any certificate of birth of a living child is presented without statement of the given or christian name, then the local registrar shall deliver to the informant a special blank for the report of the given or christian name of the child, which shall be filled out with the full name of the child, including given and christian name and surname, as soon as such child shall be named, when said informant shall forthwith deliver the properly filled out blank to the local registrar. The original certificate of birth shall not be considered to be complete until such statement of given or christian name shall be filed or the blank returned with the statement "Died unnamed." The local registrar shall immediately number each certificate of birth when filed with him, whether complete or incomplete, beginning with "No. 1" for the first birth that occurs in his district in each calendar year, and sign his name as registrar in attest of the date of filing in his office. He shall make a complete and accurate copy of each certificate registered by him, upon a form identical with the original certificate, to be filed and permanently preserved in his office, as the local record of such birth, in such manner as directed by the Secretary of State. And he shall, on or before the fourth day of each month, at the time of making his monthly report of deaths, transmit to the Secretary of State all original certificates of births registered by him for the preceding calendar month, together with any delayed certificates for preceding months, corrections of certificates previously transmitted, and supplemental statements of given or christian names of children whose names were not given in full in certificates previously filed. And if no births occurred in any month, he shall, on or before the fourth day of the following month, report that fact to the Secretary of State in such manner as he shall direct.

SEC. 4. The Secretary of State shall prepare, print, and supply to all registrars all blanks and forms used in registering, recording, and preserving the returns or in otherwise carrying out the purposes of this act, and shall prepare and issue such detailed instructions as may be required to secure the uniform observance of its provisions, and the maintenance of a perfect system of registration. And no other blanks shall be used than those supplied by the Secretary of State. He shall carefully examine the certificates received monthly from the local registrars, and if any such are incomplete or unsatisfactory, he shall require such further information to be furnished as may be necessary to make the record complete and satisfactory. And all physicians, midwives, or other informants, and all other persons having knowledge of the facts, are hereby required to furnish such information as they may possess regarding any birth, upon demand of the Secretary of State, in person, by mail, or through the local registrar. He shall further arrange, bind and permanently preserve the certificates in a systematic manner, and may prepare and maintain a comprehensive and continuous card index of all births registered, the cards to show the names of parents, name of child, place and date of birth, number

of certificate, and the volume in which it is contained, and any other necessary item.

SEC. 5. Whenever it may be alleged that the facts are not correctly stated in any certificate of birth theretofore registered, the local registrar shall require a deposition under oath to be made by the person asserting the fact, to be supported by the depositions of two or more credible persons having knowledge of the facts, setting forth the changes necessary to make the record correct. Having received such deposition, he shall file it and shall then draw a line through the incorrect statement or statements in the certificate, without erasing them, and shall make the necessary corrections, noting on the margin of the certificate his authority for so doing, and transmit the deposition, attached to the original certificate, when making his regular monthly returns to the Secretary of State. He shall correct his register in the same manner that he corrected the original certificate. If the correction relates to a certificate of birth previously returned to the Secretary of State, he shall transmit the deposition forthwith to the Secretary of State. If the correction is first made upon the original certificate of birth on file in the office of the Secretary of State, then the Secretary of State shall immediately transmit a certified copy of the original certificate, corrected as above, to the local registrar, who shall thereupon substitute such certified copy for the copy of the certificate in his records. All such corrections and marginal notes referring to them shall be made in permanent red ink, and no fee shall be charged in connection therewith.

SEC. 6. Each local registrar shall be entitled to be paid the sum of twenty-five cents for each birth certificate properly and completely made out and registered with him, and by him returned to the Secretary of State on or before the fourth day of the following month, which sum shall include the making of the copy of the certificate to be filed and preserved in his office. Certificates lacking certain items, including the given or christian name of the child in children not named at the date of filing the report, shall not be considered as defective, provided the missing information is obtained and returned to complete the certificate as elsewhere provided in this act: *Provided*, That in cities of ten thousand population or more by the last United States or State census, in which the city clerk or health officer acting as registrar, receives a fixed salary, no further compensation shall be paid for the duties required by this act. In case no births occurred during a calendar month, the local registrar shall be entitled to be paid the sum of twenty-five cents for each report to that effect promptly made in accordance with the requirements of this act. All amounts payable to any registrar under the provisions of this section shall be paid by the treasurer of the county in which the registration district is located, upon presentation of a proper warrant issued by the Secretary of State. And the Secretary of State shall issue warrants in favor of local registrars at the end of their official years, or for the year ending March thirty-one when continuing in office, specifying the number of certificates properly registered and promptly returned and the number of prompt monthly reports made by each to the effect that no births occurred, with the amount due at the rate fixed herein.

SEC. 7. At the end of each quarter, the local registrar shall send a transcript of all births registered by him for the quarter to the clerk of his county, and suitable blanks for this purpose, containing all the items now required by county records, together with stamped envelopes addressed to the county clerk, shall be supplied by the Secretary of State. Warrants in payment for returns shall be transmitted to local registrars through the clerks of their several counties, and shall be countersigned by the county clerks to indicate that the corresponding returns have been duly made to them as required above. If returns have not been made, the county clerks shall at once notify the local registrars, requiring them to do so, and if not filed by them within thirty days, shall return the warrants, with full explanations as to the registered numbers not returned, to the Secretary of State, who shall notify the local registrars of their return and, unless satisfactory explanations shall be made or the returns filed forthwith, shall cancel the warrants.

SEC. 8. On or before the tenth day of April in each year, every local registrar shall make out a complete list, on a blank provided by the Secretary of State for that purpose, of the births that have occurred in his district during the preceding calendar year, as registered with him, showing names of parents and dates of birth, and shall on or before the tenth day of April, deliver the

same to the supervisor of the township or ward where the births occurred or to the assessor or assessors of the city where the births occurred: *Provided*, That no such list shall be required for cities having a population of more than fifty thousand. The supervisors or assessors, being the officers heretofore charged with the enumeration of births under section four thousand six hundred five, Compiled Laws of eighteen hundred ninety-seven, shall receive such lists of births, and between the tenth day of April and the first day of June shall make diligent inquiry to ascertain whether any other births have occurred in their townships, wards or cities besides those duly registered and reported to them by the local registrars. And if any such births, not heretofore registered, shall come to their notice, then they shall immediately fill out a certificate of birth, as required by this act, signing the certificate as supervisor or assessor as the case may be, and shall file the same with the local registrar, together with a statement of the name and address of the physician, midwife, or person responsible for failure to file the certificate of birth immediately after birth, as required by this act, and for each added certificate of birth, duly and properly filled out and filed with the local registrar, the supervisor or assessor shall be entitled to twenty-five cents, to be paid by the county treasurer upon warrant from the Secretary of State in the same manner as to other informants. And it shall be the duty of the Secretary of State to investigate such cases and to prosecute wilful or repeated violations of this act.

SEC. 9. The Secretary of State shall, upon request, furnish any applicant a certified copy of the record of any birth registered under the provisions of this act, for the making and certification of which he shall be entitled to a fee of fifty cents, to be paid by the applicant. And any such copy of the record of a birth, when properly certified by the Secretary of State to be a true copy thereof, shall be *prima facie* evidence in all courts and places of the facts therein stated. For any search of the files and records, when no certified copy is made, the Secretary of State shall be entitled to a fee of fifty cents for each hour or fractional hour of time of search, to be paid by the applicant. And the Secretary of State shall keep a true and correct account of all fees by him received under these provisions, and turn them over to the State Treasurer.

SEC. 10. All superintendents or managers, or other persons in charge of hospitals or lying-in institutions, to which women resort for confinement, are hereby required to make a record of all the personal and statistical particulars relative to the inmates of their institutions, there residing for the purpose of confinement, at the date of taking effect of this act, that are required in the form of certificate herein provided for, in addition to such other record as may be required by existing laws or the circumstances of the case. And thereafter such record shall be by them made, for all future inmates, at the time of admission.

SEC. 11. Any physician or midwife in attendance upon a case of confinement who shall neglect or refuse to file a proper certificate of birth with the local registrar within the time required by this act, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than five dollars nor more than fifty dollars, or shall be imprisoned not to exceed thirty days, or shall suffer both such fine and imprisonment at the discretion of the court. If there was no physician or midwife in attendance upon any case or confinement, then the father, if he shall refuse or neglect to file a proper certificate of birth with the local registrar within the time required by this act, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be liable to the same penalty as that incurred by the physician or midwife in case of violation of the law, as above. And in the absence of the father, then the householder upon whose premises the birth occurred, the superintendent or manager of the public or private institution, shall individually be liable, in the order of their responsibility, and in case of conviction for failure or neglect to comply with the requirements of this act, shall be subject to the penalty imposed upon the physician or midwife in case of similar refusal or neglect. Any registrar who shall neglect or fail to enforce the provisions of this act in his district, or shall neglect or refuse to perform any of the duties imposed upon him by this act or by the instructions and directions of the Secretary of State, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than ten dollars nor more than one hundred dollars, or be imprisoned not over thirty days, or shall suffer both such

fine and imprisonment at the discretion of the court. Any person who shall wilfully alter any certificate of birth, or the copy of any certificate of birth on file in the office of the local registrar, except to correct same in the manner provided in this act, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than ten dollars nor more than one hundred dollars, or shall be imprisoned not exceeding sixty days, or shall suffer both such fine and imprisonment at the discretion of the court. And any other person or persons who shall violate any of the provisions of this act, or shall wilfully neglect or refuse to perform any duties imposed upon them by this act, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than five dollars nor more than one hundred dollars, or shall be imprisoned not exceeding thirty days, or shall suffer both such fine and imprisonment at the discretion of the court.

SEC. 12. Local registrars are hereby charged with the strict and thorough enforcement of the provisions of this act in their districts, under the supervision and direction of the Secretary of State. And they shall make an immediate report to the Secretary of State of any violations of this law coming to their notice by observation or upon complaint of any person or otherwise. The Secretary of State is hereby charged with the thorough and efficient execution of the provisions of this act in every part of the State, and with supervisory power over local registrars, to the end that all of its requirements shall be uniformly complied with. He shall have authority to investigate cases of irregularity or violation of law, personally, or by accredited representatives, and all registrars shall aid him, upon request, in such investigation. When he shall deem it necessary, he shall report cases of violation of any of the provisions of this act to the prosecuting attorney of the county, with a statement of the facts and circumstances, and when any such case is reported to them by the Secretary of State, all prosecuting attorneys or officials acting in such capacity shall forthwith initiate and promptly follow up the necessary court proceedings against the parties responsible for the alleged violation of the law. And upon request of the Secretary of State, the Attorney General shall likewise assist in the enforcement of the provisions of this act.

SEC. 13. All that part of act number one hundred ninety-four of eighteen hundred sixty-seven, as amended by act number twenty-five of eighteen hundred sixty-nine, being sections four thousand six hundred five to four thousand six hundred thirteen of the Compiled Laws of eighteen hundred ninety-seven, and inconsistent with this act, is hereby repealed, except that the births in Michigan during the year nineteen hundred five shall be enumerated, returned and compiled in accordance with said former act. This act shall go into effect for the registration of births in Michigan on January one, nineteen hundred six, but the Secretary of State shall take such preliminary steps as may be necessary to secure its enforcement on and after that date immediately upon its becoming a law.

Approved June 20, 1905.

ACT NO. 207. PUBLIC ACTS OF 1905.

AN ACT to amend section seven of act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, entitled "An act to provide for the examination, regulation, licensing and registration of physicians and surgeons, and for the punishment of offenders against this act, and to repeal acts and parts of acts in conflict therewith," as amended by act number one hundred ninety-one, of the public acts of nineteen hundred three.

The People of the State of Michigan enact:

SECTION 1. Section seven of act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, entitled "An act to provide for the examination, regulation, licensing and registration of physicians and surgeons, and for the punishment of offenders against this act, and to repeal acts and parts of acts in conflict therewith," as amended by act number one hundred ninety-one of the public acts of nineteen hundred three, is hereby amended so as to read as follows:

SEC. 7. Any person who shall practice medicine or surgery in this State, who is not the lawful possessor of a certificate of registration issued under and pursuant to act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, or the acts amendatory thereof, or without first complying with the provisions of this act, except as heretofore provided in section three of this act, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than two hundred dollars, or by imprisonment in the county jail for a period of not more than six months, or by such fine and imprisonment, for each offense. It shall be the duty of the prosecuting attorneys of the counties of this State to prosecute violations of the provisions of this act.

This act is ordered to take immediate effect.

Approved June 13, 1905.

ACT NO. 161, PUBLIC ACTS OF 1905.

AN ACT to amend section three of act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, entitled "An act to provide for the examination, regulation, licensing and registration of physicians and surgeons, and for the punishment of offenders against this act, and to repeal acts and parts of acts in conflict therewith," as amended by act number one hundred ninety-one of the public acts of nineteen hundred three.

The People of the State of Michigan enact:

SECTION 1. Section three of act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, entitled "An act to provide for the examination, regulation, licensing and registration of physicians and surgeons, and for the punishment of offenders against this act, and to repeal acts and parts of acts in conflict therewith," as amended by act number one hundred ninety-one of the public acts of nineteen hundred three, is hereby amended so as to read as follows:

SEC. 3. On and after the date of the passage of this act, all men and women who wish to begin the practice of medicine and surgery in any of its branches in this State, shall make application to the State board of registration in medicine, to be registered and for a certificate of registration. This registration and certificate shall be granted to such applicants as shall give satisfactory proofs of being twenty-one years of age and of good moral character, but only upon compliance with at least one of the following conditions contained in subdivisions one, two and three of this section:

First. The applicant shall be registered and given a certificate of registration if he shall satisfactorily pass an examination before the board upon the following subjects: Anatomy, physiology, chemistry, pathology, materia medica and therapeutics, toxicology, histology, practice of medicine, surgery, obstetrics, gynecology, mental and nervous diseases, diseases of the eye, ear, nose and throat, bacteriology, hygiene, public health laws of Michigan and medical jurisprudence; said examination to be conducted as follows:

(a) The applicant shall pay a fee of twenty-five dollars prior to examination. Provided, That the examination fee for graduates of any medical school in the State of Michigan, approved by said board shall be the sum of ten dollars.

(b) The examination shall be in writing, oral or both.

(c) The questions on all subjects, except in materia medica and therapeutics and practice of medicine, shall be such as may be answered alike by all schools of medicine.

(d) The applicant shall, if possible, be examined in materia medica and therapeutics and practice of medicine by those members of the board or by a qualified examiner appointed by the board belonging to the same school as the applicant, and no applicant shall be rejected because of his adherence to any particular system of practice.

(e) An average percentage of at least seventy-five per cent of correct answers shall be required from every candidate. No additional fee shall be charged by this board for the registration of those who successfully pass such examination.

tion: Provided, however, That such applicant for examination shall have a diploma from a legally incorporated, regularly established and reputable college of medicine within the states, territories, districts and provinces of the United States or within any foreign nation (provided such foreign nation accord a like privilege to graduates of approved medical colleges of this State) having at least a four years' course of seven months in each calendar year, as shall be approved and designated by the Board of Registration in Medicine: Also provided, That such applicant shall have, previous to the beginning of his course in medicine, a diploma from a recognized and reputable high school, academy, college or university, having a classical course, or shall pass an examination equivalent at least to the minimum standard of preliminary education adopted and published by the board before examiners appointed by and in accordance with the regulations of aforesaid board, and at such time and place as the board may designate: Provided, A student entering a college in Michigan, having a preliminary examination of a standard approval by the Board of Registration in Medicine shall not be required to take this examination: Provided, That this requirement of preliminary education shall not apply to those students who, on the date of the passage of this act, were regularly registered as students of legally organized and reputable medical colleges approved by said board: And provided, also, That the requirement of medical education shall not apply to those graduates of legally organized and reputable medical colleges approved of by said board who had graduated from such colleges, previous to the date of the passage of this act; and students complying with other provisions of this section, who on January first of the present year were regularly registered as students of legally organized and reputable medical colleges of this State, approved of by said board, may obtain a certificate of registration as graduates of such colleges and without examination by the board upon payment of a fee of ten dollars. The Board of Registration in Medicine shall, from time to time, adopt and publish a minimum standard of medical education, and no medical college shall be approved and designated by said board under this subdivision one, of section three, unless, in the judgment of the board, it conforms with such standard;

Second, The applicant shall be registered and given a certificate of registration if he shall present a certified copy or certificate of registration or license which has been issued to said applicant in any foreign nation where the requirements of registration shall be deemed by said Board of Registration in Medicine to be equivalent to those of this act: Provided, Such country shall accord a like privilege to holders of certificates from this board. The fee for registration from applicants of this class shall be twenty-five dollars;

Third, The applicant shall be registered and given a certificate of registration if he shall present a certified copy of certificate of registration or license which has been issued to said applicant within the states, territories, districts or provinces of the United States where the requirements for registration shall be deemed by the Board of Registration in Medicine to be equivalent to those of this act, and shall otherwise conform to the rules and regulations agreed upon between the State Board of which he is a licentiate and said board relative to the recognition and exchange of certificates between states: Provided, Such state shall accord a like privilege to holders of certificates from this board. The fee for registration from applicants of this class shall be twenty-five dollars;

Fourth, If any person shall unlawfully obtain and procure himself to be registered under this section, either by false and untrue statements contained in his application to the Board of Registration in Medicine, or by presenting to said board a false or untrue diploma or license, or one fraudulently obtained, he shall be deemed guilty of a felony, and on conviction thereof shall be punished by a fine not less than three hundred dollars nor more than five hundred dollars, or imprisonment at hard labor for not less than one year, nor more than three years, or both, at the discretion of the court, and shall forfeit all rights and privileges obtained or conferred upon him by virtue of such registration as a physician or surgeon;

Fifth, Any person who shall swear falsely in any affidavit or oral testimony made or given by virtue of the provisions of this act, or the regulations of the Board of Registration in Medicine, shall be deemed guilty of perjury, and upon conviction thereof shall be subject to all the pains and penalties of perjury;

Sixth, The Board of Registration in Medicine shall refuse to issue a certificate of registration provided for in this section to any person guilty of grossly un-

professional and dishonest conduct of a character likely to deceive the public, and said board shall, after due notice and hearing, revoke a certificate issued subsequent to the date of the passage of this act, or subsequent to the date of the passage of act number two hundred thirty-seven of the public acts of eighteen hundred ninety-nine, for like cause or for offenses involving moral turpitude, habitual intemperance, the drug habit, or for fraud or perjury in connection with obtaining of a certificate of registration, when such offenses shall have been legally established in a court of competent jurisdiction: Provided further, After the passage of this act, the board may at its discretion, after due notice, revoke any certificate of registration obtained or issued through error or mistake, and may also revoke the certificate of registration, after due notice and hearing, of any registered practitioner who inserts any advertisement in any newspaper, pamphlet, circular or other written or printed paper, relative to venereal diseases or other matter of any obscene or offensive nature derogatory to good morals; or who for the purpose of procuring patients employs any solicitor, capper or drummer; or who shall subsidize any hotel or boarding house; or pay or present to any person money or other valuable gift for bringing patients to him.

This act is ordered to take immediate effect.

Approved June 1, 1905.

ACT NO. 136, PUBLIC ACTS OF 1905.

AN ACT to amend section six of chapter eighty-three of the revised statutes of eighteen hundred forty-six, entitled "Of marriage and the solemnization thereof," said section being compiler's section eight thousand five hundred ninety-three of the Compiled Laws of eighteen hundred ninety-seven, as last amended by act number two hundred forty-seven of the Public Acts of eighteen hundred ninety-nine.

The People of the State of Michigan enact:

SECTION 1. Section six of chapter eighty-three of the Revised Statutes of eighteen hundred forty-six, entitled "Of marriage and the solemnization thereof," said section being compiler's section eight thousand five hundred ninety-three of the Compiled Laws of eighteen hundred ninety-seven, as last amended by act number two hundred forty-seven of the Public Acts of eighteen hundred ninety-nine, is hereby amended to read as follows:

Sec. 6. No insane person, idiot, or person who has been afflicted with syphilis or gonorrhoea and has not been cured of the same, shall be capable of contracting marriage. All marriages heretofore contracted between white persons and those wholly or in part of African descent are hereby declared valid and effectual in law for all purposes; and the issues of such marriages shall be deemed and taken as legitimate as to such issue and as to both of the parents. Any person who has been afflicted of syphilis or gonorrhoea and has not been cured of the same, who shall marry shall be deemed guilty of a felony and upon conviction thereof in any court of competent jurisdiction, shall be punished by a fine of not less than five hundred dollars nor more than one thousand dollars, or by imprisonment in the state prison at Jackson not more than five years or by both such fine and imprisonment in the discretion of the court: Provided, That in all prosecutions under this act a husband shall be examined as a witness against his wife and a wife shall be examined as a witness against her husband whether such husband or wife consent or not: And provided further, That in all cases arising under this act any physician who has attended or prescribed for any husband or wife for either of the diseases above mentioned shall be compelled to testify to any facts found by him from such attendance. No person who has been confined in any public institution or asylum as an epileptic, feeble-minded, imbecile or insane patient shall be capable of contracting marriage without, before the issuance by the county clerk of the license to marry, filing in the office of the said county clerk a verified certificate

from two regularly licensed physicians of this state that such person has been completely cured of such insanity, epilepsy, imbecility, or feeble-mindedness and that there is no probability that such person will transmit any of such defects or disabilities to the issue of such marriage. Any person of sound mind who shall intermarry with such insane person or idiot or person who has been so confined as an epileptic, feeble-minded, imbecile or insane patient in any public institution or asylum, except upon the filing of certificate as herein provided, with knowledge of the disability of such person, or who shall advise, aid, abet, cause, procure or assist in procuring any such marriage contrary to the provisions of this section shall be deemed guilty of a felony and on conviction thereof in any court of competent jurisdiction shall be punished by fine of not more than one thousand dollars or by imprisonment in the state prison at Jackson not less than one year nor more than five years, or by both such fine and imprisonment in the discretion of the court.

Approved May 25, 1905.

ACT NO. 12, PUBLIC ACTS OF 1905.

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SEC. 15. Whenever it is determined by the Dairy and Food Commissioner, his deputy or inspectors, that unsanitary conditions exist or are permitted to exist in the operation of any skimming station, creamery, cheese factory, condensed milk factory, milk depot, or farm dairy, the proprietor or proprietors, or manager of said skimming station, creamery, cheese factory, condensed milk factory or farm dairy, shall be first notified and warned by the commissioner, his deputy or inspectors to place such skimming station, creamery, cheese factory, condensed milk factory, milk depot or farm dairy in a sanitary condition, within a reasonable length of time; and any person or persons owning or operating such skimming station, creamery, cheese factory, condensed milk factory, milk depot, or farm dairy, failing to obey such notice and warning, shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not less than twenty-five, nor more than three hundred dollars and costs of prosecution, or imprisonment in the county jail; not to exceed ninety days or until such fine and costs are paid, or both fine and imprisonment in the discretion of the court.

Approved March 9, 1905.

ACT NO. 107, PUBLIC ACTS OF 1905.

AN ACT to regulate the use of artesian and other wells; to prevent the waste of waters therefrom, and provide a remedy therefor.

The People of the State of Michigan enact:

SECTION 1. Any artesian or flowing well, the water of which is unnecessarily allowed to run to waste in an unreasonable manner to the depletion or lowering of the head or reservoir thereof to the detriment or damage of other wells supplied from the same head or reservoir, shall be deemed a nuisance, and its owner and the owner of the land on which it is situated shall be subject to all the actions for abatement and damages in favor of the person or persons injured that are or may be provided by law for other nuisances or tortious acts.

SEC. 2. Where any well is supplied by a head, reservoir, stratum, or vein or by percolating waters common to other springs or wells, and the owner thereof or his lessee or licensee puts its waters to a use unreasonable or unnecessary, in view of the condition and situation of the land on which it is situated, and through such unreasonable or unnecessary use, lowers or depletes the head, pressure, or supply of water of any spring or well dependent on the same head, vein, or stratum, to the detriment or injury of the owner or any person entitled to the use thereof, the well so unreasonably and unnecessarily

used, shall be deemed to be a nuisance, and its owner and the owner of the land on which it is situated shall be subject to all the actions for abatement and damages in favor of the person or persons injured, that are or may be provided by law for other nuisances or tortious acts.

SEC. 3. Where any decree is rendered under this act declaring any well a nuisance because of the waste or unreasonable use of its waters and directing the abatement thereof, such decree shall specify in some practicable manner the daily amount or volume of water that may be used or allowed to flow therefrom without violating such decree, and specify such reasonable time as to the court shall seem just within which the provisions thereof shall be carried into effect: Provided, That any such decree may be reopened at any time after entry on the question of reasonable use on a proper showing of change of circumstances other or equitable reason therefor.

Approved May 10, 1905.

THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

SUMMARY RELATIVE TO THE STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN THE EIGHTEEN YEARS, 1886-1903.

At the regular meeting of the State Board of Health, held April 14, 1905, it was decided to discontinue, for the present, the collection of sickness statistics, "because the facts to be arrived at by this compilation had been determined, and a continuance of the work would only result in duplicating what had already been determined."

At the same meeting, the question of discontinuing the collection of meteorological statistics was left with the Secretary, with power to act.

The meteorological observations were discontinued at each station, excepting Lansing, and the further compilation of any such observations for publication in this report, was also discontinued.

Owing to the reduction in the office force, early in 1905, and the need for carrying out other and more pressing lines of work, the material collected on sickness and meteorology in 1904, was filed away without being compiled. Accordingly, this summary has been made to end with the year 1903, statistics for which year, and summaries for the ten preceding years, were published in the annual report for 1904, but in a somewhat different form from that shown in this summary.

Statistics, based on weekly postal-card reports of sickness, have been collected and compiled for the twenty-seven years, ending with 1903, and meteorological observations for a corresponding period have been used to show the relation of each disease to each season, and to each of a number of meteorological conditions.

Prior to 1885, some physicians included in their reports cases of sickness which they *believed* to be present in their locality each week, but since that time the observers reported only those diseases *under their personal observation*, *i. e.*, which they actually saw in their practice. For these reasons, this summary has been made to include only the compilations of years since 1885.

Up to and including July, 1903, the reports included information relative to twenty-eight diseases, and in July, 1903, cancer, gonorrhea and syphilis were added to the list. The compilation of the somewhat limited observations of the last three diseases has not been made, and the original number of twenty-eight diseases has been cut down in this summary to twenty-six by the combination of diphtheria with membranous croup, and of typhoid fever with typho-malarial fever.

The general prevalence of each disease, arranged in the order of their importance as causes of sickness, together with the prevalence of each disease by months, and the month, or months, of greatest prevalence, are shown in Exhibit I. With few exceptions, the five diseases heading

the list have appeared at the head of the list, and in much the same order, in nearly every compilation made on this subject. By reference to the second part of Exhibit I, it will be seen that they headed the list during the months of January, February, March, April, May, November and December; that the first four were included with the five leading diseases in the months of June and October; and that the first three diseases were among the five leading causes of sickness in every month of the average year. That the prevalence of these diseases was not limited to any particular part of the State is shown in Exhibit II, where the five diseases head the list in seven out of the eleven geographical divisions, and the first four diseases are included in the five leading diseases in every geographical division.

By reference to the first part of Exhibit I, it will be seen that many of the diseases show a marked decrease in recent years, notably intermittent fever, remittent fever, consumption, pneumonia, erysipelas, dysentery, cholera morbus, inflammation of bowels and cholera infantum. Some of these diseases show a much greater decrease in recent years when compared with the statistics for years previous to 1886. Many factors have contributed to this reduction in the sickness, notably the general surface and subsoil drainage, and the organized efforts put forth by the State and local health departments for the suppression of the dangerous communicable diseases. The education of the people in matters pertaining to general and personal hygiene has probably contributed in no small degree to this gratifying result.

EXHIBIT I.—*The prevalence of twenty-six prominent diseases in Michigan, in the eighteen years, 1886-1903. Diseases arranged in the order of greatest amount of sickness in the average year.—CONTINUED ON NEXT PAGE.*

Order, 1886-1903	Diseases.	The per cent of weekly reports which stated the presence of each disease.										
		1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
1	Rheumatism.....	70	69	66	65	71	69	64	64	62	60	60
2	Neuralgia.....	67	67	62	63	67	66	61	57	56	56	54
3	Bronehitis.....	56	55	59	58	65	60	54	53	50	52	51
4	Tonsillitis.....	49	47	41	46	50	49	48	49	42	43	45
5	Influenza.....	35	33	32	32	53	55	42	43	41	44	44
6	Diarrhea.....	45	48	41	45	44	47	43	40	40	42	34
7	Consumption, pul.....	55	51	49	48	52	49	38	38	36	29	23
8	Intermittent fever.....	54	48	45	43	41	36	27	24	24	22	19
9	Pneumonia.....	27	28	20	26	30	27	25	22	20	21	18
10	Remittent fever.....	34	32	34	30	27	28	21	18	20	20	16
11	Inflammation of kidney.....	20	18	19	20	21	20	21	17	17	20	16
12	Typhoid fever*.....	24	26	25	26	15	17	14	13	15	17	12
13	Erysipelas.....	23	24	24	22	21	19	16	14	13	13	12
14	Pleuritis.....	‡	‡	18	17	19	21	18	14	13	17	16
15	Dysentery.....	17	19	17	17	16	16	15	13	14	15	11
16	Cholera morbus.....	17	19	15	14	15	16	15	14	14	15	11
17	Inflammation of bowels.....	17	16	14	14	14	15	13	12	13	11	10
18	Scarlet fever.....	11	8	9	10	10	9	12	10	14	12	8
19	Cholera infantum.....	14	13	11	11	10	13	11	10	12	12	8
20	Whooping-cough.....	20	14	9	16	9	9	10	9	12	9	7
21	Measles.....	6	14	16	6	12	10	4	7	6	4	7
22	Diphtheria†.....	18	14	11	9	12	10	10	9	9	7	6
23	Puerperal fever.....	5	6	4	5	4	3	4	3	2	2	2
24	Inflammation of brain.....	5	6	5	5	5	4	3	3	3	3	3
25	Meningitis.....	4	3	3	3	3	3	2	2	1	.8	1
26	Smallpox.....	.4	.02	.03	.03	.1	0	.02	.3	.6	.3	4

EXHIBIT I.—CONTINUED.

Order, 1886-1903.

	Diseases.	The per cent of weekly reports which stated the presence of each disease.							Av. 1886- 1903.
		1897.	1898.	1899.	1900.	1901.	1902.	1903.	
1	Rheumatism.....	66	62	63	63	61	59	57	64
2	Neuralgia.....	58	54	56	56	57	52	49	59
3	Bronchitis.....	50	49	50	49	50	47	48	53
4	Tonsillitis.....	43	40	42	45	46	47	46	45
5	Influenza.....	47	45	42	40	44	37	37	41
6	Diarrhea.....	34	36	37	40	36	33	31	40
7	Consumption, pul.....	20	20	22	25	22	20	20	34
8	Intermittent fever.....	17	19	17	16	14	13	12	27
9	Pneumonia.....	19	17	17	16	20	19	17	22
10	Remittent fever.....	11	13	12	11	9	7	6	19
11	Inflammation of kidney.....	17	17	19	20	20	18	19	19
12	Typhoid fever*	7.9	10	10	18	14	14	15	16
13	Erysipelas.....	14	12	10	10	9	9	8	15
14	Pleuritis.....	18	15	16	16	17	18	15	15
15	Dysentery.....	12	12	13	14	9	7	7	14
16	Cholera morbus.....	10	12	10	14	10	8	8	13
17	Inflammation of bowels.....	10	10	10	11	9	9	9	12
18	Scarlet fever.....	4	5	8	12	14	14	13	10
19	Cholera infantum.....	8	8	8	12	7	5	5	10
20	Whooping-cough.....	4	5	4	5	5	7	7	9
21	Measles.....	13	7	6	13	5	10	9	9
22	Diphtheria†.....	5.7	3.5	3.6	4.4	5.4	5.5	6.4	8
23	Puerperal fever.....	2	2	2	2	2	1	1	3
24	Inflammation of brain.....	2	2	2	1	.9	1	1	3
25	Meningitis	1	2	3	1	1	1	.9	2
26	Smallpox.....	.05	.04	.4	1	7	8	7	1.6

*Includes typho-malarial fever, both in this and other exhibits.

†Includes membranous croup, both in this and other exhibits.

‡Not compiled until 1888.

EXHIBIT I.—CONTINUED.—*The average monthly prevalence of the twenty-six diseases, in the eighteen years, 1886-1903. Diseases arranged, as in the first part of this Exhibit, in the order of greatest amount of sickness in the average year. Months of greatest prevalence are in bold face type.*

Order, 1886-1903.	Diseases.	The average per cent of weekly reports which stated the presence of each disease.											
		Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Rheumatism.....	67	67	69	69	67	64	59	57	60	63	64	66
2	Neuralgia.....	64	64	66	65	60	55	52	51	53	57	59	61
3	Bronchitis.....	64	66	65	63	54	45	38	37	43	50	56	61
4	Tonsillitis.....	56	56	55	52	46	37	33	32	35	43	51	55
5	Influenza.....	66	70	68	58	40	26	17	17	24	30	41	54
6	Diarrhea.....	24	23	25	26	28	36	58	72	70	49	30	25
7	Consumption, pul.....	35	35	36	37	36	35	34	33	33	33	33	33
8	Intermittent fever.....	22	21	23	28	28	29	31	32	32	31	26	22
9	Pneumonia.....	39	42	39	33	24	13	8	6	9	13	20	27
10	Remittent fever.....	17	16	15	17	18	19	20	24	25	24	20	17
11	Inflammation of kidney.....	20	20	21	22	21	19	18	16	16	17	19	19
12	Typhoid fever*.....	12	9	8	8	7	8	12	22	30	32	24	16
13	Erysipelas	17	18	18	19	17	16	13	12	12	13	15	17
14	Pleuritis	21	22	22	19	16	12	10	8	10	11	14	18
15	Dysentery.....	5	5	5	5	6	8	19	37	36	20	7	5
16	Cholera morbus.....	3	3	3	3	6	12	29	40	32	13	5	3
17	Inflammation of bowels.....	10	10	11	11	11	12	14	17	15	12	10	11
18	Scarlet fever.....	13	12	11	12	11	9	7	7	8	10	11	12
19	Cholera infantum.....	1	1	1	1	3	7	21	34	30	11	2	1
20	Whooping-cough.....	8	8	9	9	10	9	11	10	9	7	8	8
21	Measles.....	7	10	13	16	13	15	9	4	3	3	4	5
22	Diphtheria†.....	11	10	8	7	7	6	5	5	6	11	12	11
23	Puerperal fever.....	4	3	4	4	3	3	3	2	2	3	2	3
24	Inflammation of brain.....	3	4	3	4	3	3	3	3	3	3	3	3
25	Meningitis.....	2	2	3	3	3	2	2	2	2	2	1	2
26	Smallpox.....	2.1	2.2	2.3	2.1	1.6	1.5	1.1	1	.7	.5	1	1.6

EXHIBIT I.—CONTINUED.—*The seasonal prevalence of the twenty-six diseases, in the eighteen years, 1886-1903. Diseases arranged in the order of greatest amount of sickness in each month.*

Order.	Average per cent of weekly reports which stated the presence of the disease.					
	January.	February.	March.			
1	Rheumatism.....	67	Influenza.....	70	Rheumatism.....	69
2	Influenza.....	66	Rheumatism.....	67	Influenza.....	68
3	Bronchitis.....	64	Bronchitis.....	66	Neuralgia.....	66
4	Neuralgia.....	64	Neuralgia.....	64	Bronchitis.....	65
5	Tonsillitis.....	56	Tonsillitis.....	56	Tonsillitis.....	55
6	Pneumonia.....	39	Pneumonia.....	42	Pneumonia.....	39
7	Consumption, pul.	35	Consumption, pul.	35	Consumption, pul.	36
8	Diarrhea.....	24	Diarrhea.....	23	Diarrhea.....	25
9	Intermittent fever.	22	Pleuritis.....	22	Intermittent fever.	23
10	Pleuritis.....	21	Intermittent fever.	21	Pleuritis.....	22
11	Inflammation of kidney.	20	Inflammation of kidney.	20	Inflammation of kidney.....	21
12	Remittent fever.	17	Erysipelas.....	18	Erysipelas.....	18
13	Erysipelas.....	17	Remittent fever.	16	Remittent fever.....	15
14	Scarlet fever.....	13	Scarlet fever.....	12	Measles.....	13
15	Typhoid fever.....	12	Inflammation of bowels.	10	Inflammation of bowels.....	11
16	Diphtheria.....	11	Measles.....	10	Scarlet fever.....	11
17	Inflammation of bowels.	10	Diphtheria.....	10	Whooping-cough.....	9
18	Whooping-cough.....	8	Typhoid fever.....	9	Diphtheria.....	8
19	Measles.....	7	Whooping-cough.....	8	Typhoid fever.....	8
20	Dysentery.....	5	Dysentery.....	5	Dysentery.....	5
21	Puerperal fever.	4	Inflammation of brain.	4	Puerperal fever.....	4
22	Cholera morbus.	3	Cholera morbus.	3	Cholera morbus.....	3
23	Inflammation of brain.	3	Puerperal fever.	3	Inflammation of brain.....	3
24	Smallpox.....	2.1	Smallpox.....	2.2	Meningitis.....	3
25	Meningitis.....	2	Meningitis.....	2	Smallpox.....	2.3
26	Cholera infantum.	1	Cholera infantum.	1	Cholera infantum.....	1
April.						
May.						
June.						
1	Rheumatism.....	69	Rheumatism.....	67	Rheumatism.....	64
2	Neuralgia.....	65	Neuralgia.....	60	Neuralgia.....	55
3	Bronchitis.....	63	Bronchitis.....	54	Bronchitis.....	45
4	Influenza.....	55	Tonsillitis.....	46	Tonsillitis.....	37
5	Tonsillitis.....	52	Influenza.....	40	Diarrhea.....	36 *
6	Consumption, pul.	37	Consumption, pul.	36	Consumption, pul.	35
7	Pneumonia.....	33	Diarrhea.....	28	Intermittent fever.....	29
8	Intermittent fever.	28	Intermittent fever.	28	Influenza.....	26
9	Diarrhea.....	26	Pneumonia.....	24	Remittent fever.....	19
10	Inflammation of kidney.	22	Inflammation of kidney.	21	Inflammation of kidney.....	19
11	Erysipelas.....	19	Remittent fever.	18	Erysipelas.....	16
12	Pleuritis.....	19	Measles.....	18	Measles.....	15
13	Remittent fever.	17	Erysipelas.....	17	Pneumonia.....	13
14	Measles.....	16	Pleuritis.....	16	Pleuritis.....	12
15	Scarlet fever.....	12	Inflammation of bowels.	11	Cholera morbus.....	12
16	Inflammation of bowels.	11	Scarlet fever.....	11	Inflammation of bowels.....	12
17	Whooping-cough.....	9	Whooping-cough.....	10	Scarlet fever.....	9
18	Typhoid fever.....	8	Typhoid fever.....	7	Whooping-cough.....	9
19	Diphtheria.....	7	Diphtheria.....	7	Typhoid fever.....	8
20	Dysentery.....	5	Dysentery.....	6	Dysentery.....	8
21	Puerperal fever.	4	Cholera morbus.....	6	Cholera infantum.....	7
22	Inflammation of brain.	4	Puerperal fever.	3	Diphtheria.....	6
23	Meningitis.....	3	Inflammation of brain.	3	Puerperal fever.....	3
24	Cholera morbus.	3	Cholera infantum.	3	Inflammation of brain.....	3
25	Smallpox.....	2.1	Meningitis.....	3	Meningitis.....	2
26	Cholera infantum.	1	Smallpox.....	1.6	Small pox.....	1.5

EXHIBIT I.—CONCLUDED.

Average per cent of weekly reports which stated the presence of the disease.

Order.	July.	August.	September.	
1	Rheumatism.....	59	Diarrhea.....	72
2	Diarhœa.....	58	Rheumatism.....	57
3	Neuralgia.....	52	Neuralgia.....	51
4	Bronchitis.....	38	Cholera morbus.....	40
5	Consumption, pul.	34	Bronchitis.....	37
6	Tonsillitis.....	33	Dysentery.....	37
7	Intermittent fever.....	31	Cholera infantum.....	34
8	Cholera morbus.....	29	Consumption, pul.	33
9	Cholera infantum.....	21	Tonsillitis.....	32
10	Remittent fever.....	20	Intermittent fever.....	32
11	Dysentery.....	19	Remittent fever.....	24
12	Inflammation of kidney.....	18	Typhoid fever.....	22
13	Influenza.....	17	Influenza.....	17
14	Inflammation of bowels.....	14	Inflammation of bowels.....	17
15	Erysipelas.....	13	Inflammation of kidney.....	16
16	Typhoid fever.....	12	Erysipelas.....	12
17	Whooping-cough.....	11	Whooping-cough.....	10
18	Pleuritis.....	10	Pleuritis.....	8
19	Measles.....	9	Scarlet fever.....	7
20	Pneumonia.....	8	Pneumonia.....	6
21	Scarlet fever.....	7	Diphtheria.....	5
22	Diphtheria.....	5	Measles.....	4
23	Puerperal fever.....	3	Inflammation of brain.....	3
24	Inflammation of brain.....	3	Puerperal fever.....	2
25	Meningitis.....	2	Meningitis.....	2
26	Smallpox.....	1.1	Smallpox.....	1
				.7
	October.	November.	December.	
1	Rheumatism.....	63	Rheumatism.....	64
2	Neuralgia.....	57	Neuralgia.....	59
3	Bronchitis.....	50	Bronchitis.....	56
4	Diarhœa.....	49	Tonsillitis.....	51
5	Tonsillitis.....	43	Influenza.....	41
6	Consumption, pul.	33	Consumption, pul.	33
7	Typhoid fever.....	32	Diarrhea.....	30
8	Intermittent fever.....	31	Intermittent fever.....	26
9	Influenza.....	30	Typhoid fever.....	24
10	Remittent fever.....	24	Remittent fever.....	20
11	Dysentery.....	20	Pneumonia.....	20
12	Inflammation of kidney.....	17	Inflammation of kidney.....	19
13	Pneumonia.....	13	Erysipelas.....	15
14	Erysipelas.....	13	Pleuritis.....	14
15	Cholera morbus.....	13	Diphtheria.....	12
16	Inflammation of bowels.....	12	Scarlet fever.....	11
17	Pleuritis.....	11	Inflammation of bowels.....	10
18	Cholera infantum.....	11	Whooping-cough.....	8
19	Diphtheria.....	11	Dysentery.....	7
20	Scarlet fever.....	10	Cholera morbus.....	5
21	Whooping-cough.....	7	Measles.....	4
22	Measles.....	3	Inflammation of brain.....	3
23	Puerperal fever.....	3	Cholera infantum.....	2
24	Inflammation of brain.....	3	Puerperal fever.....	2
25	Meningitis.....	2	Meningitis.....	1
26	Smallpox.....	5	Smallpox.....	1
				1.6
				1

EXHIBIT II.—*The geographical distribution of the twenty-six diseases, as indicated by the average per cent of weekly reports which stated the presence of each disease, in each of eleven geographical divisions,* in the eighteen years, 1886-1903. Diseases arranged in order of greatest amount of sickness in each division.*

Order.	Average per cent of weekly reports which stated the presence of the disease.					
	UPPER PENINSULAR DIVISION.	NORTHWESTERN DIVISION.	NORTHERN DIVISION.			
1	Bronchitis.....	59	Rheumatism.....	59	Rheumatism.....	61
2	Tonsillitis.....	53	Bronchitis.....	59	Bronchitis.....	55
3	Rheumatism.....	52	Neuralgia.....	58	Neuralgia.....	52
4	Diarrhea.....	51	Tonsillitis.....	49	Tonsillitis.....	40
5	Neuralgia.....	49	Diarrhea.....	43	Influenza.....	36
6	Consumption, pul.	41	Influenza.....	41	Consumption, pul.	29
7	Influenza.....	35	Consumption, pul.	39	Diarrhea.....	26
8	Typhoid fever.....	28	Pneumonia.....	32	Erysipelas.....	23
9	Pneumonia.....	27	Intermittent fever.....	27	Pleuritis.....	21
10	Inflammation of kidney.....	20	Remittent fever.....	22	Inflammation of kidney.....	20
11	Scarlet fever.....	18	Pleuritis.....	20	Pneumonia.....	19
12	Dysentery.....	16	Inflammation of kidney.....	19	Intermittent fever.....	18
13	Whooping-cough.....	16	Typhoid fever.....	18	Dysentery.....	13
14	Cholera morbus.....	16	Dysentery.....	17	Remittent fever.....	12
15	Diphtheria.....	15	Erysipelas.....	16	Typhoid fever.....	11
16	Cholera infantum.....	14	Cholera morbus.....	15	Inflammation of bowels.....	10
17	Pleuritis.....	14	Cholera infantum.....	14	Cholera morbus.....	9
18	Erysipelas.....	12	Inflammation of bowels.....	13	Cholera infantum.....	8
19	Inflammation of bowels.....	11	Scarlet fever.....	12	Inflammation of brain.....	8
20	Measles.....	10	Mesles.....	8	Diphtheria.....	6
21	Inflammation of brain.....	5	Diphtheria.....	8	Measles.....	6
22	Puerperal fever.....	5	Whooping-cough.....	6	Scarlet fever.....	6
23	Meningitis.....	4	Inflammation of brain.....	4	Whooping-cough.....	6
24	Intermittent fever.....	3	Puerperal fever.....	4	Meningitis.....	4
25	Remittent fever.....	2	Meningitis.....	2	Puerperal fever.....	4
26	Smallpox.....	2	Smallpox.....	1	Smallpox.....	1
NORTHEASTERN DIVISION.		WESTERN DIVISION.			NORTHERN CENTRAL DIVISION.	
1	Bronchitis.....	70	Rheumatism.....	64	Rheumatism.....	54
2	Rheumatism.....	70	Neuralgia.....	63	Neuralgia.....	46
3	Neuralgia.....	67	Bronchitis.....	48	Bronchitis.....	44
4	Influenza.....	60	Influenza.....	47	Tonsillitis.....	38
5	Tonsillitis.....	57	Tonsillitis.....	46	Intermittent fever.....	37
6	Diarrhea.....	46	Diarrhea.....	39	Diarrhea.....	35
7	Inflammation of kidney.....	46	Intermittent fever.....	34	Consumption, pul.	26
8	Erysipelas.....	33	Consumption, pul.	29	Influenza.....	24
9	Pleuritis.....	32	Remittent fever.....	29	Remittent fever.....	23
10	Inflammation of bowels.....	27	Pneumonia.....	23	Pneumonia.....	19
11	Pneumonia.....	25	Erysipelas.....	18	Typhoid fever.....	14
12	Intermittent fever.....	21	Inflammation of kidney.....	18	Erysipelas.....	13
13	Consumption, pul.	20	Typhoid fever.....	14	Dysentery.....	12
14	Dysentery.....	9	Pleuritis.....	14	Cholera infantum.....	10
15	Diphtheria.....	8	Inflammation of bowels.....	13	Cholera morbus.....	10
16	Remittent fever.....	8	Dysentery.....	13	Inflammation of kidney.....	10
17	Cholera morbus.....	7	Cholera morbus.....	11	Measles.....	8
18	Cholera infantum.....	6	Diphtheria.....	9	Pleuritis.....	8
19	Measles.....	6	Cholera infantum.....	9	Scarlet fever.....	8
20	Whooping-cough.....	6	Measles.....	9	Whooping-cough.....	7
21	Scarlet fever.....	5	Scarlet fever.....	9	Inflammation of bowels.....	5
22	Typhoid fever.....	4	Whooping-cough.....	8	Diphtheria.....	5
23	Inflammation of brain.....	3	Puerperal fever.....	4	Puerperal fever.....	4
24	Puerperal fever.....	2	Inflammation of brain.....	3	Inflammation of brain.....	2
25	Smallpox.....	2	Meningitis.....	2	Smallpox.....	2
26	Meningitis.....	.9	Smallpox.....	2	Meningitis.....	1

*The counties in these divisions are shown in Exhibit III.

EXHIBIT II.—CONCLUDED.

Average per cent of weekly reports which stated the presence of the disease.

Order.	BAY AND EASTERN DIVISION.	CENTRAL DIVISION.	SOUTHWESTERN DIVISION.	
1	Rheumatism.....	57	Rheumatism.....	64
2	Neuralgia.....	53	Neuralgia.....	63
3	Bronchitis.....	50	Bronchitis.....	53
4	Tonsillitis.....	40	Tonsillitis.....	43
5	Influenza.....	39	Influenza.....	42
6	Diarrhea.....	36	Diarrhea.....	40
7	Consumption, pul.	34	Consumption, pul.	37
8	Intermittent fever.....	22	Intermittent fever.....	29
9	Pneumonia.....	22	Remittent fever.....	23
10	Typhoid fever.....	20	Inflammation of kidney.....	20
11	Pleuritis.....	17	Pneumonia.....	20
12	Inflammation of kidney.....	16	Erysipelas.....	17
13	Inflammation of bowels.....	14	Typhoid fever.....	14
14	Cholera morbus.....	14	Erysipelas.....	14
15	Erysipelas.....	14	Dysentery.....	13
16	Remittent fever.....	14	Pleuritis.....	13
17	Dysentery.....	13	Inflammation of bowels.....	12
18	Cholera infantum.....	12	Cholera morbus.....	12
19	Diphtheria.....	11	Scarlet fever.....	9
20	Scarlet fever.....	10	Cholera infantum.....	8
21	Whooping-cough.....	9	Measles.....	8
22	Measles.....	8	Whooping-cough.....	8
23	Inflammation of brain.....	3	Measles.....	6
24	Puerperal fever.....	3	Diphtheria.....	3
25	Meningitis.....	2	Inflammation of brain.....	3
26	Smallpox.....	2	Puerperal fever.....	2
			Meningitis.....	1
			Smallpox.....	.7
<hr/>				
SOUTHERN CENTRAL DIVISION.		SOUTHEASTERN DIVISION.		
1	Rheumatism.....	71	Rheumatism.....	60
2	Neuralgia.....	67	Bronchitis.....	53
3	Bronchitis.....	54	Neuralgia.....	47
4	Tonsillitis.....	51	Tonsillitis.....	40
5	Influenza.....	46	Consumption, pul.	38
6	Diarrhea.....	41	Diarrhea.....	37
7	Consumption, pul.	34	Influenza.....	35
8	Intermittent fever.....	30	Intermittent fever.....	22
9	Pneumonia.....	23	Inflammation of kidney.....	21
10	Remittent fever.....	22	Pneumonia.....	19
11	Inflammation of kidney.....	17	Typhoid fever.....	18
12	Dysentery.....	15	Remittent fever.....	15
13	Cholera morbus.....	15	Erysipelas.....	14
14	Pleuritis.....	14	Pleuritis.....	13
15	Typhoid fever.....	13	Cholera morbus.....	12
16	Erysipelas.....	12	Scarlet fever.....	12
17	Inflammation of bowels.....	11	Inflammation of bowels.....	11
18	Scarlet fever.....	10	Diphtheria.....	11
19	Cholera infantum.....	9	Dysentery.....	11
20	Measles.....	9	Measles.....	9
21	Whooping-cough.....	9	Whooping-cough.....	9
22	Diphtheria.....	6	Cholera infantum.....	8
23	Inflammation of brain.....	3	Inflammation of brain.....	4
24	Puerperal fever.....	2	Puerperal fever.....	3
25	Meningitis.....	1	Meningitis.....	2
26	Smallpox.....	.8	Smallpox.....	1

EXHIBIT III.—Eleven Geographical Divisions of the State, formed for the purpose of facilitating the study of Causes of Sickness and of Deaths, with a list of Counties included in each Division.

1.—Upper Peninsula.	2.—Northwestern.	3.—Northern.	4.—Northeastern.	5.—Western.	6.—Northern Central.	7.—Bay and Eastern.	8.—Central.	9.—South-western.	10.—Southern Central.	11.—South-eastern.	
Aleg. Baraga. Chippewa. Delta. Dickinson. Gogebic. Houghton. Iron. Keweenaw Luce. Mackinac Marquette. Menominee. Ontonagon. Schoolcraft.	Benzie. Gd. Traverse. Leelanau. Manistee. Westford. Gogebic. Houghton. Iron. Keweenaw Luce. Mackinac Marquette. Menominee. Ontonagon. Schoolcraft.	Antrim. Charlevoix. Cheboygan. Crawford. Emmet. Kalkaska. Oscoda. Otsego. Presque Isle. Iron.	Alcona. Alpena. Iosco. Montmorency. Ogemaw. Osceola. Kalkaska. Houghton. Iron. Keweenaw Luce. Mackinac Marquette. Menominee. Ontonagon. Schoolcraft.	Kent. Lake. Mason. Muskegon. Newaygo. Oceana. Ottawa. Presque Isle. Iron.	Clare. Gladwin. Isabella Muskegon. Midland. Roscommon. Sanilac. Missaukee. Oscoda. Ottawa.	Arenac. Bay. Huron. Lapeer. Midland. Roscommon. Sanilac. St. Clair. Tuscola. Oscoda.	Barry. Clinton. Eaton. Genesee. Saginaw. Sanilac. Ionia. Livingston. Montcalm. Shiawassee.	Allegan. Berrien. Cass. Van Buren.	Barry. Clinton. Eaton. Genesee. Gratiot. Ingham. Ionia. Livingston. Montcalm. Shiawassee.	Branch. Calhoun. Hillsdale. Jackson. Kalamazoo. Lenawee. St. Joseph. Washtenaw.	Macomb. Monroe. Oakland. Wayne.

On pages 201 and 217 of the report of this Board for 1886, the divisions and the counties in each were indicated by lines on maps of the State.

CLIMATE AND SICKNESS.

In previous annual reports, propositions were stated concerning a possible relation between sickness from the twenty-six diseases, considered in this summary, and certain meteorological conditions, but only for a single year. Exhibits IV to XXI are summaries of these separate yearly studies for the eighteen years, 1886-1903, and are arranged in two groups, one representing the diseases most prevalent in the cold months, and the other the diseases most prevalent in the warm months, of the year. In Exhibits IV-XIX and XXI-XXX, the months are arranged in order according to the prevalence of each disease, those months in which most sickness was reported being placed above the average line, the others below that line. The meteorological conditions for each month are also printed, in their respective columns, in the line for the month. This arrangement renders it easy to see whether the temperature, of any of the meteorological conditions, was above or below its average in months when more or less than the average sickness from any disease was reported.

A summary of the exhibits representing the cold-weather diseases is shown in Exhibit XX, and a summary of the warm-weather diseases in Exhibit XXXI.

For convenience in studying the several exhibits, the propositions before-mentioned are reprinted in this summary. It has never been supposed that the propositions are in every case true concerning the diseases, and in studying the exhibits it should be borne in mind that the changes in prevalence of most diseases occur a month or more later than the changes in the atmospheric conditions.

Relations of bronchitis and other "cold-weather" diseases to meteorological conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox or inflammation of brain, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits IV-XIX, the letter *a* marks exceptions to this proposition.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox, or inflammation of brain, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits IV-XIX, the letter *b* marks exceptions to this proposition.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 2, it is true, also, that the quantity of vapor inhaled daily was less than the average, and the quantity exhaled daily in excess of that inhaled was greater than the average in months where more than the average per cent of reports stated presence of bronchitis, or of the other diseases named in propositions 1 and 2; and that more vapor was inhaled and a less excess exhaled daily in months when the per cent of reports stating presence of bronchitis, or of the other diseases named in propositions 1 and 2, was less than the average.

Relations of diarrhea and other "warm-weather" diseases to meteorological conditions.

PROPOSITION 1.—That in months when more than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, cholera morbus, dysentery, measles, whooping-cough, or inflammation of bowels, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were greater than the average for the year; and in months when less than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were less than the average for the year.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, cholera morbus, dysentery, measles, whooping cough, or inflammation of bowels, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were less than the average for the year; and that in months when less than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were greater than the average for the year.

In Exhibits XXI-XXX, the letters *a* and *b* mark exceptions to propositions 1 and 2.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 1, it is true, also, that the quantity of vapor inhaled daily was greater than the average, and the quantity exhaled daily in excess of that inhaled was less than the average in months when more than the average per cent of reports stated presence of diarrhea, or of the other diseases named in propositions 1 and 2; and that less vapor was inhaled and a greater excess exhaled daily in months when the per cent of reports stating presence of diarrhea, or of the other diseases named in propositions 1 and 2 was less than the average.

Analyses of Exhibits XX and XXI, on subsequent pages, indicate that the meteorological conditions, named in the exhibits, which were the most intimately associated with the cold-weather diseases, were average temperature, absolute humidity, average daily range of atmospheric pressure, day ozone, and average velocity of wind, and that, with one exception, these same conditions were similarly related to the warm weather diseases.

The diseases which appear to be the most intimately associated with

the meteorological conditions named, are bronchitis, tonsillitis, influenza, rheumatism, neuralgia, intermittent fever, whooping-cough, and inflammation of bowels.

The diseases which appear to be the least intimately connected with the meteorological conditions named, are meningitis, inflammation of brain, typhoid fever and measles.

It will be seen that, as a whole, the exceptions to the propositions were comparatively few. A possible reason for the exceptions noted may be found in the fact that many diseases which are influenced by changes in the weather do not always appear at the time of such changes, but lag behind the changes and so vitiate the statistics based upon propositions such as have been made use of in the study of the causes of sickness in Michigan.

EXHIBIT IV.—*The relation between BRONCHITIS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.		Humidity.	Temperature.	Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.							
	Average.	Average daily range.					Range.							
	Absolute.	Relative.					Day.	Night.						
February.....	66	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	65	30.91	16.61	1.80	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	20.114
January.....	64	22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4	1.260	.287	29.105
April.....	63	45.55	b17.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209	b 29.127
December.....	61	27.46	12.90	1.73	83	1.08	10.60	72	a 3.63	4.23	11.2	1.101	.258	29.114
November.....	56	36.69	13.80	2.35	81	1.47	10.21	69	a 3.23	a 3.48	11.0	1.109	.248	b 29.127
May.....	54	b56.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771	a .161	29.081
Average.....	53	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
October.....	50	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143
June.....	45	66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.678	.135	b 29.091
September.....	43	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	38	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123	b 29.110
August.....	37	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125	29.125

*Calculated for 18 respirations per minute of 20 cubic inches of air each.

†Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 Troy ounces of vapor exhaled daily. No correction has been made for the expansion of air after it is inhaled.

a. An exception to Proposition 1, on a preceding page.

b. An exception to Proposition 2, on a preceding page.

EXHIBIT V.—*The relation between PNEUMONIA and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.	
		Average.	Average daily range.	Absolute.	Relative.			Range.	Average pressure.
February.....	42	22.17	16.11	1.45	83 .91	10.77	66	3.98 Day. 4.42 Night.	11.0 1.278 .285 29.110
March.....	39	30.91	16.61	1.89	80 1.18	10.50	57	4.06 Day. 4.42 Night.	11.1 1.147 .250 29.114
January.....	39	22.68	14.50	1.48	84 .93	10.75	73	3.86 a 3.92	10.4 1.260 .287 29.105
April.....	33	45.55 b	18.80	2.91	a 73 1.82	9.86 a 52	3.77	4.26 Day. 4.03 Night.	10.5 1.000 .209 b 29.127
December.....	27	27.46	12.90	1.73	83 1.08	10.60	72 a	3.63	11.2 1.101 .258 29.114
May.....	24	656.66 b	20.05 b	4.10	a 72 2.31	9.37 a 51	4.11	4.52 Day. a 9.4 a .771 a .161	29.081
Average.....	22	46.63	17.73	3.49	77 2.18	9.50	55	3.67 Day. 3.97 Night.	.929 .204 29.117
November.....	20 b	36.69 b	13.80 b	2.35	a 81 1.47	10.21 a 69	3.23	3.48 a 11.0 a 1.109 a .248	29.127
October.....	13	49.49 b	17.69 b	3.47	77 2.17	9.51	53	3.27 Day. 3.44 Night.	.974 .202 29.143
June.....	13	66.73	20.69	5.60	74 3.50	8.18	46 a	3.85 a 4.29	8.0 .678 .135 b 29.091
September.....	9	61.56	20.03	4.92	76 3.08	8.60	44	3.23 Day. 3.34 Night.	.771 .169 29.164
July.....	8	71.26	21.14	6.14	72 3.84	7.84	40	3.18 Day. 3.53 Night.	.569 .123 b 29.110
August.....	6	68.42	20.41	5.80	74 3.63	8.05	42 a	3.85 3.97	7.6 .570 .125 29.125

* , † , a , b. These footnotes are under Exhibit IV.

EXHIBIT VI.—*The relation between DIPHTHERIA and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.												Atmospheric pressure.
	Temperature.			Humidity.			Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative, Scale of 10°.			
Average.	Average daily range.	Absolute.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled; †	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Range.	Average pressure.	
November.....	12 36.69	13.80	2.35	81	1.47	10.21	69	a 3.23	a 3.48	11.0	1.109	.248 b 29.127	
December.....	11 27.46	12.90	1.73	83	1.08	10.60	72	a 3.63	4.03	11.2	1.101	.258 29.114	
October.....	11 b49.49	17.69	3.47	77	2.17	9.51	a 53	a 3.27	a 3.44	9.8	.974 a .202	b 29.143	
January.....	11 22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4	1.260	.287 29.105	
February.....	10 22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285 29.110	
Average.....	84 46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204 29.117	
March.....	8 b30.91	b16.61	b 1.89	a 80	1.18	10.50	a 57	a 4.06	a 4.42	a 11.1	a 1.147	a .250 b 29.114	
April.....	7 b45.55	18.80	b 2.91	73	1.82	9.86	52	a 3.77	a 4.26	a 10.5	a 1.000	a .209 29.127	
May.....	7 56.66	20.05	4.10	72	2.31	9.37	51	a 4.11	a 4.52	9.4	.771	.161 b 29.081	
June.....	6 66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.678	.135 b 29.091	
September.....	6 61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169 29.164	
July.....	5 71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 b 29.110	
August.....	5 68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125 29.125	

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT VII.—*The relation between TONSILLITIS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.			Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative, Scale of 10°.			Atmospheric pressure.		
				Average.							Day.		Night.		Range.	
				Average daily range.		Absolute.		Inhaled.*			Exhaled in excess of that inhaled.†					
January.....	56	22.68	14.50	1.48	84	.93	10.75	73	3.86	3.92	10.4	1.260	.287	29.105		
February.....	56	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110		
March.....	55	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114		
December.....	55	27.46	12.90	1.73	83	1.08	10.60	72 a	3.63	4.03	11.2	1.101	.258	29.114		
April.....	52	45.55	18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209 b	29.127		
November.....	51	36.69	13.80	2.35	81	1.47	10.21	69 a	3.23 a	3.48	11.0	1.109	.248 b	29.127		
May.....	46	650.66	620.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4 a	.771 a	.161	29.081		
Average.....	45	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117		
October.....	43	49.49	b 17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8 a	.974	.202	29.143		
June.....	37	66.73	20.69	5.60	74	3.50	8.18	46 a	3.85 a	4.29	8.0	.678	.135 b	29.091		
September.....	35	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164		
July.....	33	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 b	29.110		
August.....	32	68.42	20.41	5.80	74	3.63	8.05	42 a	3.85	3.97	7.6	.570	.125	29.125		

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT VIII.—*The relation between INFLUENZA and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the prevalence of the disease.	Per cent of weekly reports stating the prevalence of the disease.		Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10°.		Atmospheric pressure.			
	Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled, in excess of that inhaled.†	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Average daily.	Average pressure.		
February.....	70	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	68	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
January.....	66	22.68	14.50	1.48	84	.93	10.75	73	3.86	3.92	10.4	1.260	.287	29.105
April.....	58	45.55	18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209 ^b	29.127
December.....	54	27.46	12.90	1.73	83	1.08	10.60	72	a 3.63	4.03	.11.2	1.101	.258	29.114
Average.....	41+	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
November.....	41	836.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0	a 1.109	a .248	29.127
May.....	40	56.66	20.05	4.10	72	2.31	9.37	51	a 4.11	a 4.52	9.4	.771	.161 ^b	29.081
October.....	30	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143
June.....	26	66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.678	.135 ^b	29.091
September.....	24	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	17	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 ^b	29.110
August.....	17	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125	29.125

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT IX.—*The relation between SCARLET FEVER and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.	
		Average.	Average daily range.	Absolute.	Relative.			Day.	Night.
January.....	13	22.68	14.50	1.48	84	.93	10.75	73	3.86 a 3.92
February.....	12	22.17	16.11	1.45	83	.91	10.77	66	3.98 4.42
December.....	12	27.46	12.90	1.73	83	1.08	10.60	72 a 3.63	4.03 11.2 1.101
April.....	12	45.55 b	18.80	2.91	a 73	1.82	9.86 a 52	3.77	4.26 10.5 1.000
May.....	11	56.66 b	20.05 b	4.10	a 72	2.31	9.37 a 51	4.11	4.52 a 9.4 a .771 a .161
March.....	11	30.91	16.61	1.89	80	1.18	10.50	57	4.06 4.42 11.1 1.147
November.....	11	36.69	13.80	2.35	81	1.47	10.21	69 a 3.23 a 3.48	11.0 1.109
October.....	10+	49.49 b	17.69	3.47	77	2.17	9.51 a 53 a 3.27 a 3.44	9.8 .974 a .202 b	.29.127
Average.....	10	46.63	17.73	3.49	77	2.18	9.50	55 3.67 3.97	9.8 .929 .204 29.117
June.....	9	66.73	20.69	5.60	74	3.50	8.18	46 a 3.85 a 4.29	8.0 .678 .135 b 29.091
September.....	8	61.56	20.03	4.92	76	3.08	8.60	44 3.23 3.34	9.0 .771 .169 29.164
July.....	7	71.26	21.14	6.14	72	3.84	7.84	40 3.18 3.53	7.9 .569 .123 b 29.110
August.....	7	68.42	20.41	5.80	74	3.63	8.05	42 a 3.85 3.97	7.6 .570 .125 29.125

*[†], a, b. These footnotes are under Exhibit IV.

EXHIBIT X.—*The relation between RHEUMATISM and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10°.		Atmospheric pressure.	
	Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled, †	Day.	Night.	Average monthly.	Range.
March.....	69	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42
April.....	69	45.55	18.80	2.91	a 73	1.82	9.86 a 52	3.77	4.26	10.5
May.....	67	65.66	20.05	b 4.10	a 72	2.31	9.37 a 51	4.11	4.52	a 9.4
January.....	67	22.68	14.50	1.48	84	.93	10.75	73	3.86 a 3.92	10.4
February.....	67	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42
December.....	66	27.46	12.90	1.73	83	1.08	10.60	72 a 3.63	4.03	11.2
November.....	64+	36.69	13.80	2.35	81	1.47	10.21	69 a 3.23 a 3.48	11.0	1.109
Average.....	64	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97
June.....	64	66.73	20.69	5.60	74	3.50	8.18	40 a 3.85 a 4.29	8.0	.678
October.....	63	49.49	17.69	b 3.47	77	2.17	9.51	53	3.27	3.44
September.....	60	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34
July.....	59	71.26	21.14	6.14	72	3.81	7.84	40	3.18	3.53
August.....	57	68.42	20.41	5.80	74	3.63	8.05	42 a 3.85	3.97	7.6

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XI.—*The relation between NEURALGIA and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.						Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.			
	Temperature.		Humidity.						Range.			
	Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Day.	Night.	Average monthly.	Average daily.	Average pressure.	
March.....	66	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147
April.....	65	45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000
January.....	64	22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4	1.260
February.....	64	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278
December.....	61	27.46	12.90	1.73	83	1.08	10.60	72	a 3.63	4.03	11.2	1.101
May.....	60	b56.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771
November.....	59+	36.69	13.80	2.35	81	1.47	10.21	69	a 3.23	a 3.48	11.0	1.109
Average.....	59	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929
October.....	57	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974
June.....	55	66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.078
September.....	53	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771
July.....	52	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569
August.....	51	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XII.—*The relation between PULMONARY CONSUMPTION and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest extent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.		
		Average.	Average daily range.	Absolute.	Relative.			Range.	Average pressure.	
April.....	37 45.55 b18.80	2.91	a 73	1.82	9.86 a 52	3.77	4.26	10.5	1.000 .209 b 29.127	
May.....	36 b56.66 b20.05 b	4.10	a 72	2.31	9.37 a 51	4.11	4.52	a 9.4 a .771 a .161	29.081	
March.....	36 30.91 16.61	1.89	80	1.18	10.50 57	4.06	4.42	11.1	1.147 .250 29.114	
June.....	35 b66.73 b20.69 b	5.00	a 74	3.50	8.18 a 46	3.85	4.29	a 8.0 a .673 a .135	29.091	
January.....	35 22.68 14.50	1.48	84	.93	10.75 73	3.86 a 3.92	10.4	1.260 .287	29.105	
February.....	35 22.17 16.11	1.45	83	.91	10.77 66	3.98	4.42	11.0	1.278 .285	29.110
Average.....	34+ 46.63 17.73	3.49	77	2.18	9.50 55	3.67	3.97	9.8	.929 .204	29.117
July.....	34 71.26 21.14	6.14	72	3.84	7.84 40	3.18	3.53	7.9	.569 .123 b 29.110	
August.....	33 68.42 20.41	5.80	74	3.03	8.05 42 a	3.85	3.97	7.6	.570 .125	29.125
September.....	33 61.56 20.03	4.92	76	3.08	8.60 44	3.23	3.34	9.0	.771 .169	29.164
October.....	33 49.49 b17.69 b	3.47	77	2.17	9.51 53	3.27	3.44	9.8 a .974	.202	29.143
November.....	33 b36.69 b13.80 b	2.35	a 81	1.47	10.21 a 69	3.23	3.48 a 11.0 a 1.109 a	.248	.248	29.127
December.....	33 b27.46 b12.90 b	1.73	a 83	1.08	10.60 a 72	3.63 a 4.03 a 11.2 a 1.101 a	.258 b	.258	b 29.114	

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XIII.—*The relation between PLEURITIS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.		Temperature.	Humidity.	Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.							
	Average.	Average daily range.												
	Absolute.	Relative.												
February.....	22	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	22	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
January.....	21	22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4	1.260	.287	29.105
April.....	19	45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209	b 29.127
December.....	18	27.46	12.90	1.73	83	1.08	10.60	72	a 3.63	4.03	11.2	1.101	.258	29.114
May.....	16	656.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771	a .161	29.081
Average.....	15	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
November.....	14	636.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0	a 1.109	a .248	29.127
June.....	12	66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.675	.135	b 29.091
October.....	11	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143
September.....	10	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	10	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123	b 29.110
August.....	8	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125	29.125

*. †. a, b. These footnotes are under Exhibit IV.

EXHIBIT XIV.—*The relation between INFLAMMATION OF KIDNEY and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the prevalence of the disease.		Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative. Scale of 10°.	Atmospheric pressure.				
	Average.	Average daily range	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled;†			Range.	Average pressure.			
April.....	22 45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209 b	29.127
May.....	21 b56.66	b20.05 b	4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771 a	.161	29.081
March.....	21 30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
January.....	20 22.68	14.50	1.48	84	.93	10.75	73	3.80	a 3.92	10.4	1.260	.287	29.105
February.....	20 22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
June.....	19+ b66.73	b20.69 b	5.60	a 74	3.50	8.18	a 46	3.85	4.29	a 8.0	a .678 a	.135	29.091
November.....	19+ 36.69	13.80	2.35	81	1.47	10.21	69 a	3.23 a	3.48	11.0	1.109	.248 b	29.127
Average.....	19 46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
December.....	19 b27.46	b12.90 b	1.73	a 83	1.08	10.60	a 72	3.63	a 4.03 a	11.2	a 1.101 a	.258 b	29.114
July.....	18 71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 b	29.110
October.....	17 49.49	b17.69 b	3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143
August.....	16 68.42	20.41	5.80	74	3.63	8.05	42 a	3.85	3.97	7.6	.570	.125	29.125
September.....	16 61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XV.—*The relation between MENINGITIS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.												Atmospheric pressure.	
	Temperature.			Humidity.			Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative, Scale of 10 ³ .				
	Average.	Average daily range.	Absolute.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Average per cent of cloudiness.	Day	Night.	Average monthly.	Range.		
March.....	3 30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114	
April.....	3 45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209	b 29.127	
May.....	3 b56.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771	a .161	29.081	
September.....	2+ b61.56	b20.03	b 4.92	a 76	3.08	8.60	a 44	a 3.23	a 3.34	a 9.0	a .771	a .169	b 29.164	
Average.....	2 46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117	
January.....	2 b22.68	b14.50	b 1.48	a 84	.93	10.75	a 73	a 3.86	3.92	a 10.4	a 1.260	a .287	b 29.105	
February.....	2 b22.17	b16.11	b 1.45	a 83	.91	10.77	a 66	a 3.98	a 4.42	a 11.0	a 1.278	a .285	b 29.110	
June.....	2 66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0	.678	.135	b 29.091	
July.....	2 71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123	b 29.110	
August.....	2 68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125	29.125	
October.....	2 49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143	
December.....	2 b27.46	b12.90	b 1.73	a 83	1.05	10.60	a 72	3.63	a 4.03	a 11.2	a 1.101	a .255	b 29.114	
November.....	1 b36.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0	a 1.109	a .248	29.127	

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XVI.—*The relation between PUERPERAL FEVER and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.	Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.										Atmospheric pressure.			
		Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative. Scale of 10°.		Range.				
		Average.	Average daily range	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Average daily.	Average pressure.		
March.....	4	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114	
April.....	4	45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5	1.000	.209	b 29.127	
January.....	4	22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4	1.260	.287	29.105	
February.....	3+	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110	
May.....	3+	b56.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4	a .771	a .161	29.081	
June.....	3+	b66.73	b20.69	b 5.60	a 74	3.50	8.18	a 46	3.85	4.29	a 8.0	a .678	a .135	29.091	
Average.....		3	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
December.....	3	b27.46	b12.90	b 1.73	a 83	1.08	10.60	a 72	3.63	a 4.03	a 11.2	a 1.101	a .253	b 29.114	
October.....	3	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8	a .974	.202	29.143	
July.....	3	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123	b 29.110	
August.....	2	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6	.570	.125	29.125	
September.....	2	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164	
November.....	2	b36.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0	a 1.109	a .248	29.127	

* , † , a , b. These footnotes are under Exhibit IV.

EXHIBIT XVII.—*The relation between ERYSPHELES and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10°.		Atmospheric pressure.	
		Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Day.	Night.	Average monthly.	Average daily.
April.....	19	45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5
February.....	18	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0
March.....	18	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1
January.....	17	22.68	14.50	1.48	84	.93	10.75	73	3.86	a 3.92	10.4
December.....	17	27.46	12.90	1.73	83	1.08	10.00	72	a 3.63	4.03	11.2
May.....	17	b56.66	b20.05	b 4.10	a 72	2.31	9.37	a 51	4.11	4.52	a 9.4
June.....	16	b66.73	b20.69	b 5.60	a 74	3.50	8.18	a 46	3.85	4.29	a 8.0
Average.....	15+	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8
November.....	15	b36.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0
October.....	13	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8
July.....	13	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9
August.....	12	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6
September.....	12	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XVIII.—*The relation between SMALLPOX and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Month	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10°.		Atmospheric pressure.	
		Average.	Average daily range.	Absolute.	Relative	Inhaled.*	Exhaled in excess of that inhaled.†	Day.	Night.	Average monthly.	Range.
March.....	2.3	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1
February.....	2.2	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0
January.....	2.1	22.68	14.50	1.48	84	.93	10.75	73	3.86	3.92	10.4
April.....	2.1	45.55	b18.80	2.91	a 73	1.82	9.86	a 52	3.77	4.26	10.5
Average.....	1.6 ^b	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8
December.....	1.6	b27.46	b12.90	b 1.73	a 83	1.08	10.60	a 72	3.63	a 4.03	a 11.2
May.....	1.6	56.66	20.05	4.10	72	2.31	9.37	51	a 4.11	a 4.52	9.4
June.....	1.5	66.73	20.69	5.60	74	3.50	8.18	46	a 3.85	a 4.29	8.0
July.....	1.1	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9
August.....	1.0	68.42	20.41	5.80	74	3.63	8.05	42	a 3.85	3.97	7.6
November.....	1.0	b36.69	b13.80	b 2.35	a 81	1.47	10.21	a 69	3.23	3.48	a 11.0
September.....	.7	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0
October.....	.5	49.49	b17.69	b 3.47	77	2.17	9.51	53	3.27	3.44	9.8

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XIX.—*The relation between INFLAMMATION OF BRAIN and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Months—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.		Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10° .		Atmospheric pressure.		
		Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Average daily.	Range.	
February.....	3.7	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
April.....	3.6	45.55	b18.80	2.91	a 73	1.82	9.86 a 52	3.77	4.26	10.5	1.000	.209 b	29.127	
June.....	3.4	b66.73	b20.69 b	5.60	a 74	3.50	8.18 a 46	3.85	4.29	a 8.0 a .678 a .135	29.091			
May.....	3.3	b56.66	b20.05 b	4.10	a 72	2.31	9.37 a 51	4.11	4.52	a 9.4 a .771 a .161	29.081			
January.....	3.2	22.68	14.50	1.48	84	.93	10.75	73	3.86 a 3.92	10.4	1.260	.287	29.105	
March.....	3.2	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
July.....	3.2	b71.26	b21.14 b	6.14	a 72	3.84	7.84 a 40 a 3.18 a 3.53	a 7.9 a .569 a .123	29.110					
August.....	3.1*	b68.42	b20.41 b	5.80	a 74	3.63	8.05 a 42	3.85	3.97	a 7.6 a .570 a .125 b	29.125			
Average.....	3.1	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
December.....	2.9	b27.46	b12.90 b	1.73	a 83	1.08	10.60 a 72	3.63 a 4.03 a 11.2 a 1.101 a .258 b	29.114					
September.....	2.8	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
October.....	2.7	49.49	b17.69 b	3.47	77	2.17	9.51	53	3.27	3.44	9.8 a .974	.202	29.143	
November	2.6	b36.69	b13.80 b	2.35	a 81	1.47	10.21 a 69	3.23	3.43 a 11.0 a 1.109 a .248	29.127				

* †, a, b. These footnotes are under Exhibit IV.

COLD WEATHER DISEASES.

EXHIBIT XX.—Summary relative to Exhibits IV to XIX, inclusive, showing the months in which the diseases were more or less prevalent than usual, and the number of months in which the propositions relative to "Climate and Sickness" held true.

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent.	Months (inclusive) in which diseases named were less than usually prevalent.	For the 12 months of the average year. Number of months in which propositions hold true.*											
			That in months when diseases named were more than usually prevalent the conditions named below were greater than usual, and in months when less than usually prevalent these conditions were less than usual.											
			That in mos, when diseases named were more than usually prevalent the conditions named below were lower than usual, and in months when the diseases were less than usually prevalent these conditions were higher than usual.											
			Relative humidity.†	Av. per cent of cloudiness.	Ozone.	Atmospheric pressure.				Average temperature.	Av. daily range of temp.	Average daily atmospheric pressure.	Absolute humidity.	
				Day.	Night.†	Range.	Monthly.	Daily.	Av. daily.					
Bronchitis.....	Jan.-May, Nov.-Dec.	June-October.....	9	10	8	8	10	10	11	11	9	8	10	
Pneumonia.....	Jan.-May, Dec.....	June-November.....	8	9	9	9	9	9	10	10	10	8	9	9
Diphtheria.....	Jan.-Feb., Oct.-Dec.	March-September..	10	10	4	4	9	10	9	9	11	6	10	
Tonsillitis.....	Jan.-May Nov., Dec.	June-October.....	9	10	8	8	10	10	11	11	9	8	10	
Influenza.....	Jan.-April, Dee....	May-November....	9	10	8	8	10	10	11	11	9	8	10	
Scarlet fever.....	Jan.-May, Oct.-Dec.	June-September....	9	9	7	7	10	11	10	10	10	7	11	
Rheumatism.....	Jan.-May, Nov., Dec.	June-October.....	9	10	8	8	10	10	11	11	9	8	10	
Neuralgia.....	Jan.-May, Nov., Dec.	June-October.....	9	10	8	8	10	10	11	11	9	8	10	
Consumption, pul.	January-June.....	July-December....	6	7	11	9	7	7	8	8	6	9	7	
Pleuritis.....	Jan.-May, Dec....	June-November....	8	9	9	9	9	9	10	10	8	9	9	
Inflammation of kidney...	Jan.-June, Nov....	July-Oct., Dec....	7	8	10	8	8	8	9	9	7	8	8	
Meningitis.....	Mar.-May, Sept....	Jan., Feb., June-Aug., Oct.-Dec.	4	5	7	7	5	5	6	6	4	5	5	
Puerperal fever.....	January-June.....	July-December....	6	7	11	9	7	7	8	8	6	9	7	
Erysipelas.....	Jan.-June, Dec....	July-November....	7	8	10	10	8	8	9	9	7	10	8	
Smallpox.....	January-April....	May-December....	8	9	9	7	9	9	10	10	8	7	9	
Inflammation of brain....	January-August....	Sept.-December....	4	5	11	8	5	5	6	6	4	9	5	

*When not otherwise specified, the figures in each of these eleven columns show for how many months out of the twelve months the proposition named over the column holds true; thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in nine months out of the twelve; that relative to average temperature, in eleven out of the twelve, etc. Most of the cold-weather diseases usually reach a maximum prevalence one month or more later than the coldest month, and the changes in prevalence lag behind the temperature changes in the several months.

†The figures in these columns are the number of months in which the propositions held true in periods of eleven months, because in one month out of the twelve, the meteorological condition, named at the head of the column, was neither more or less prevalent than the average.

EXHIBIT XXI.—*The relation between DIARRHEA and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.										Atmospheric pressure.			
	Temperature.			Humidity.			Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative, Scale of 10°.				
	Average.	Average daily range.	Absolute.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Average daily.	Average pressure.	
August.....	72	68.42	20.41	5.80	74	3.63	8.05	42 b	3.85	3.97	7.6	.570	.125	29.125
September.....	70	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	58	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 a	29.110
October.....	49	49.49	a17.69 a	3.47	77	2.17	9.51	53	3.27	3.44	9.8 b	.974	.202	29.143
Average.....	40	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
June.....	36	a66.73	a20.69 a	5.60	b 74	3.50	8.18 b	46	3.85	4.29	b 8.0 b	.078 b	.135	29.091
November	30	36.69	13.80	2.35	81	1.47	10.21	69 b	3.23 b	3.48	11.0	1.109	.248 a	29.127
May	28	a56.66	a20.05 a	4.10	b 72	2.31	9.37 b	51	4.11	4.52	b 9.4 b	.771 b	.161	29.081
April.....	26	45.55	a18.80	2.91	b 73	1.82	9.86 b	52	3.77	4.26	10.5	1.000	.209 a	29.127
March.....	25	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
December.....	25	27.46	12.90	1.73	83	1.08	10.60	72 b	3.63	4.03	11.2	1.101	.258	29.114
January.....	24	22.68	14.50	1.48	84	.93	10.75	73	3.86 b	3.92	10.4	1.260	.287	29.105
February.....	23	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110

* †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXII.—*The relation between CHOLERA MORBUS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Months.—Arranged in order of greatest per cent of weekly reports stating the prevalence of the disease.												Atmospheric pressure.	
	Temperature.			Humidity.			Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative. Scale of 10°.			Range.	
	Average.	Average daily range.	Absolute.	Inhaled.*	Exhaled in excess of that inhaled.†	Absolute.	Day.	Night.	Average monthly.	Average daily.	Average pressure.	Range.	Average pressure.	
August.....	40	68.42	20.41	5.80	74	3.63	8.05	42 b	3.85	3.97	7.6	.570	.125	29.125
September.....	32	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	29	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 a	29.110 ^a
Average.....	13+	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
October.....	13 a	49.49	17.69	3.47	77	2.17	9.51	b 53	b 3.27	b 3.44	9.8	.974 b	.202 a	29.143
June.....	12 a	66.73	a 20.69	a 5.60	b 74	3.50	8.18	b 46	3.85	4.29	b 8.0 b	.678 b	.135	29.091
May.....	6 a	56.66	a 20.05	a 4.10	b 72	2.31	9.37	b 51	4.11	4.52	b 9.4 b	.771 b	.161	29.081
November.....	5	36.69	13.80	2.35	81	1.47	10.21	69 b	3.23	b 3.48	11.0	1.109	.248 a	29.127
December.....	3	27.46	12.90	1.73	83	1.08	10.60	72 b	3.63	4.03	11.2	1.101	.258	29.114
January.....	3	22.68	14.50	1.48	84	.93	10.75	73	3.86	b 3.92	10.4	1.260	.287	29.105
February.....	3	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	3	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
April.....	3	45.55 a	18.80	2.91	b 73	1.82	9.86	b 52	3.77	4.26	10.5	1.000	.209 a	29.127

*, †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXIII.—The relation between CHOLERA INFANTUM and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.

Months—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.			Ozone, relative, Scale of 10°.		Atmospheric pressure.				
	Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Average per cent of cloudiness.	Day.	Night.	Average monthly.	Range.	Average pressure.		
August.....	34	68.42	20.41	5.80	74	3.63	8.05	42 b	3.85	3.97	7.6	.570	.125	29.125
September.....	30	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
July.....	21	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 a	29.110
October.....	11	49.49	a17.69 a	3.47	77	2.17	9.51	53	3.27	3.44	9.8 b	.974	.202	29.143
Average.....	10	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
June.....	7 a	66.73	a20.69 a	5.60	b 74	3.50	8.18 b	46	3.85	4.29	b 8.0 b	.678	b 135	29.091
May.....	3 a	56.06	a20.05 a	4.10	b 72	2.31	9.37 b	51	4.11	4.52	b 9.4 b	.771	b 161	29.081
November.....	2	36.69	13.80	2.35	81	1.47	10.21	69 b	3.23 b	3.48	11.0	1.109	.248 a	29.127
January.....	1	22.08	14.50	1.48	84	.93	10.75	73	3.86 b	3.92	10.4	1.260	.287	29.105
February.....	1	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	1	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
April.....	1	45.55	a18.80	2.91	b 73	1.82	9.86 b	52	3.77	4.26	10.5	1.000	.209 a	29.127
December.....	1	27.46	12.90	1.73	83	1.08	10.60	72 b	3.63	4.03	11.2	1.101	.258	29.114

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXIV.—*The relation between DYSENTERY and certain meteorological conditions in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Temperature.			Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative. Scale of 10°.	Atmospheric pressure.			
	Per cent of weekly reports stating the presence of the disease.		Average.	Average daily range.				Average monthly.	Range.		
	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Day.			Average daily.	Average pressure.		
August.....	37	68.42	20.41	5.80	74	3.63	8.05	42 b 3.85	.570 .125 29.125		
September.....	36	61.56	20.03	4.92	76	3.08	8.60	44 3.23	.771 .169 29.164		
October.....	20	49.49	a17.69	a 3.47	77	2.17	9.51	53 3.27	.974 .202 29.143		
July.....	19	71.26	21.14	6.14	72	3.84	7.84	40 3.18	.569 .123 a 29.110		
Average.....	14	46.63	17.73	3.49	77	2.18	9.50	55 3.67	.204 29.117		
June.....	8	a66.73	a20.69	a 5.60	b 74	3.50	8.18	b 46	3.85 4.29 b 8.0 b .678 b .135 29.091		
November.....	7	36.69	13.80	2.35	81	1.47	10.21	69 b 3.23 b 3.48	11.0 1.109 .248 a 29.127		
May.....	6	a56.66	a20.05	a 4.10	b 72	2.31	9.37	b 51	4.11 4.52 b 9.4 b .771 b .161 29.081		
January.....	5	22.68	14.50	1.48	84	.93	10.75	73 3.86 b 3.92	10.4 1.260 .287 29.105		
February.....	5	22.17	16.11	1.45	83	.91	10.77	66 3.98	4.42 11.0 1.278 .285 29.110		
March.....	5	30.91	16.61	1.89	80	1.18	10.50	57 4.06	4.42 11.1 1.147 .250 29.114		
April.....	5	45.55	a18.80	2.91	b 73	1.82	9.86	b 52	3.77 4.26 10.5 1.000 .209 a 29.127		
December.....	5	27.46	12.90	1.73	83	1.08	10.60	72 b 3.63	4.03 11.2 1.101 .258 29.114		

*, †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXV.—*The relation between INFLAMMATION OF BOWELS and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.		Temperature.	Humidity.	Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.			
	Average.	Average daily range.					Average monthly.	Average daily.	Average pressure.	
August.....	17	68.42	20.41	5.80	74	3.63	8.05	42 b 3.85	3.97	7.6 .570 .125 29.125
September.....	15	61.56	20.03	4.92	76	3.08	8.00	44 b 3.23	3.34	9.0 .771 .169 29.164
July.....	14	71.26	21.14	6.14	72	3.84	7.84	40 b 3.18	3.53	7.9 .560 .123 a 29.110
June.....	12+	66.73	20.69	5.60	74	3.50	8.18	46 b 3.85 b 4.29	8.0	.678 .135 a 29.091
October.....	12+	49.49 a 17.69	a 3.47		77	2.17	9.51	53 b 3.27	3.44	9.8 b .974 .202 29.143
Average.....	12	46.63	17.73	3.49	77	2.18	9.50	55 b 3.67	3.97	9.8 .929 .204 29.117
December.....	11	27.46	12.90	1.73	83	1.08	10.60 b 72 b	3.63	4.03	11.2 1,101 .258 29.114
March.....	11	30.91	16.61	1.89	80	1.18	10.50	57 b 4.06	4.42	11.1 1,147 .250 29.114
April.....	11	45.55 a 18.80	a 2.91	b 73	1.82	9.86 b 52	3.77	4.26 b 51	4.11	10.5 1,000 .209 a 29.127
May.....	11	a 56.66 a 20.05	a 4.10	b 72	2.31	9.37 b 51	4.11	4.52 b 9.4 b	.771 b	.161 29.081
January.....	10	22.68	14.50	1.48	84	.93	10.75	73 b 3.86 b 3.92	10.4	1,260 .287 29.105
February.....	10	22.17	16.11	1.45	83	.91	10.77	66 b 3.98 b 4.42	11.0	1,278 .285 29.110
November.....	10	36.69	13.80	2.35	81	1.47	10.21	69 b 3.23 b 3.48	11.0	1,109 .248 a 29.127

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXVI.—*The relation between TYPHOID FEVER and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months.—Arranged in order of greatest per cent of weekly reports stating the prevalence of the disease.	Per cent of weekly reports stating the prevalence of the disease.		Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.					
	Average.	Average daily range,	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†			Day.	Night.				
October.....	32	49.49	a17.69	a 3.47	77	2.17	9.51	53	3.27	3.44	9.8	.974	.202	29.143
September.....	30	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
November.....	24	a36.69	a13.80	a 2.35	b 81	1.47	10.21	b 69	3.23	3.48	b 11.0	b 1.109	b .248	29.127
August.....	22	68.42	20.41	5.80	74	3.63	8.05	42	b 3.85	3.97	7.6	.570	.125	29.125
December.....	16+	a27.46	a12.90	a 1.73	b 83	1.08	10.60	b 72	3.63	b 4.03	b 11.2	b 1.101	b .258	a 29.111
Average.....	16	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
January.....	12	22.68	14.50	1.48	84	.93	10.75	73	3.86	b 3.92	10.4	1.260	.287	29.105
July.....	12	a71.26	a21.14	a 6.14	b 72	3.84	7.84	b 40	b 3.18	b 3.53	b 7.9	b .569	b .123	29.110
February.....	9	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	8	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114
April.....	8	45.55	a18.80	2.91	b 73	1.82	9.86	b 52	3.77	4.26	10.5	1.000	.209	a 29.127
June.....	8	a66.73	a20.69	a 5.60	b 74	3.50	8.18	b 46	3.85	4.29	b 8.0	b .678	b .135	29.091
May.....	7	a56.66	a20.05	a 4.10	b 72	2.31	9.37	b .51	4.11	4.52	b 9.4	b .771	b .161	29.081

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXVII.—*The relation between INTERMITTENT FEVER and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity,		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative. Scale of 19°.	Atmospheric pressure.	
		Average.	Average daily range.	Absolute.	Relative.			Average monthly.	Range.
August.....	32	68.42	20.41	5.80	74	3.63	8.05	42 b 3.85	7.6 b .570 .125 29.125
September.....	32	61.56	20.03	4.92	76	3.08	8.60	44 3.23	9.0 b .771 .169 29.164
October.....	31	49.49	a17.69	a 3.47	77	2.17	9.51	53 3.27	9.8 .974 .202 29.143
July.....	31	71.26	21.14	6.14	72	3.84	7.84	40 3.18	7.9 b .569 .123 a 29.110
June.....	29	66.73	20.69	5.60	74	3.50	8.18	46 b 3.85 b 4.29	8.0 b .678 .135 a 29.091
April.....	28	a45.55	18.80	a 2.91	73	1.82	9.86	52 b 3.77 b 4.26 b	10.5 1.000 b .209 29.127
May.....	28	56.66	20.05	4.10	72	2.31	9.37	51 b 4.11 b 4.52	9.4 b .771 .161 a 29.081
Average.....	27	46.63	17.73	3.49	77	2.18	9.50	55 3.67	9.8 .929 .204 29.117
November.....	26	36.69	13.80	2.35	81	1.47	10.21	69 b 3.23 b 3.48	11.0 1.109 .248 a 29.127
March.....	23	30.91	16.61	1.89	80	1.18	10.50	57 4.06	4.42 11.1 1.147 .250 29.114
Deeember.....	22	27.46	12.90	1.73	83	1.08	10.60	72 b 3.63	4.03 11.2 1.101 .258 29.114
January.....	22	22.68	14.50	1.48	84	.93	10.75	73 3.86 b 3.92	10.4 1.260 .287 29.105
February.....	21	22.17	16.11	1.45	83	.91	10.77	66 3.98	4.42 11.0 1.278 .285 29.110

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXVIII.—*The relation between REMITTENT FEVER and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative. Scale of 10°.		Atmospheric pressure.				
		Average.		Average daily range.		Inhaled.*		Exhaled in excess of that inhaled.†		Range.				
		Absolute.	Relative.	Absolute.	Relative.	Average per cent of cloudiness.	Average velocity of wind—miles per hour	Day.	Night.	Average monthly.	Average daily			
September.....	25	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169	29.164
October.....	24	49.49	a17.69	a 3.47	77	2.17	9.51	53	3.27	3.44	9.8	b .974	.202	29.143
August.....	24	68.42	20.41	5.80	74	3.63	8.05	42	b 3.85	3.97	7.6	.570	.125	29.125
November.....	20	a36.69	a13.80	a 2.35	b 81	1.47	10.21	b 69	3.23	3.48	b 11.0	b 1.109	b .248	29.127
July.....	20	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123	a 29.110
Average.....	19+	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204	29.117
June.....	19	a66.73	a20.69	a 5.60	b 74	3.50	8.18	b 46	3.85	4.29	b 8.0	b .678	b .135	29.091
May.....	18	a56.66	a20.05	a 4.10	b 72	2.31	9.37	b 51	4.11	4.52	b 9.4	b .771	b .161	29.081
April.....	17	45.55	a18.80	2.91	b 73	1.82	9.86	b 52	3.77	4.26	10.5	1.000	.209	a 29.127
December.....	17	27.46	12.90	1.73	83	1.08	10.60	72	b 3.63	4.03	11.2	1.101	.258	29.114
January.....	17	22.68	14.50	1.48	84	.93	10.75	73	3.86	b 3.92	10.4	1,260	.287	29.105
February.....	16	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285	29.110
March.....	15	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250	29.114

* , † , a , b. These footnotes are under Exhibit IV.

EXHIBIT XXIX.—*The relation between MEASLES and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

Months—Arranged in order of greatest per cent of weekly reports stating the presence of the disease.	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.	Ozone, relative, Scale of 10°.	Atmospheric pressure.		
		Average,	Average daily range,	Absolute,	Relative,			Day.	Night.	Range.
May.....	18	56.66	20.05	4.10	72	2.31	9.37	51	b 4.11 b 4.52	9.4 .771 .161 a 29.081
April.....	16	a 45.55	18.80	a 2.91	73	1.82	9.86	52	b 3.77 b 4.26	b 10.5 b 1.000 b .209 29.127
June.....	15	66.73	20.69	5.60	74	3.50	8.18	46	b 3.85 b 4.29	8.0 .678 .135 a 29.091
March.....	13	a 30.91	a 16.61	a 1.89	b 80	1.18	10.50	b 57	b 4.06 b 4.42	b 11.1 b 1.147 b .250 a 29.114
February.....	10	a 22.17	a 16.11	a 1.45	b 83	.91	10.77	b 66	b 3.98 b 4.42	b 11.0 b 1.278 b .285 a 29.110
July.....	9+	71.26	21.14	6.14	72	3.84	7.84	40	3.18 3.53	7.9 .569 .123 a 29.110
Average.....	9	46.63	17.73	3.49	77	2.18	9.50	55	3.67 3.97	9.8 .929 .204 29.117
January.....	7	22.68	14.50	1.48	84	.93	10.75	73	3.86 b 3.92	10.4 1.260 .287 29.105
December.....	5	27.46	12.90	1.73	83	1.08	10.60	72	b 3.63 4.03	11.2 1.101 .258 29.114
November.....	4	36.69	13.80	2.35	81	1.47	10.21	69	b 3.23 b 3.48	11.0 1.109 .248 a 29.127
August.....	4	a 68.42	a 20.41	a 5.80	b 74	3.63	8.05	b 42	3.55 3.97	b 7.6 b .570 b .125 a 29.125
September.....	3	a 61.56	a 20.03	4.92	b 76	3.08	8.60	b 44	b 3.23 b 3.34	b 9.0 b .771 b .169 a 29.164
October.....	3	a 49.49	17.69	3.47	77	2.17	9.51	b 53	b 3.27 b 3.44	9.8 .974 b .202 a 29.143

* , †, a, b. These footnotes are under Exhibit IV.

EXHIBIT XXX.—*The relation between WHOOPING-COUGH and certain meteorological conditions, in Michigan, during the 18 years, 1886-1903.*

	Per cent of weekly reports stating the presence of the disease.	Temperature.		Humidity.		Vapor inhaled and exhaled from the air passages by one person in 24 hours, Troy ounces.		Ozone, relative, Scale of 10°.		Atmospheric pressure			
		Average.	Average daily range.	Absolute.	Relative.	Inhaled.*	Exhaled in excess of that inhaled.†	Day.	Night.	Average monthly.	Average daily.		
July.....	11	71.26	21.14	6.14	72	3.84	7.84	40	3.18	3.53	7.9	.569	.123 a 29.110
August.....	10	68.42	20.41	5.80	74	3.63	8.05	42 b	3.85	3.97	7.6	.570	.125 29.125
May.....	10	56.66	20.05	4.10	72	2.31	9.37	51 b	4.11	b 4.52	9.4	.771	.161 a 29.081
June.....	9+	66.73	20.69	5.60	74	3.50	8.18	46 b	3.85	b 4.29	8.0	.678	.135 a 29.091
September.....	9+	61.56	20.03	4.92	76	3.08	8.60	44	3.23	3.34	9.0	.771	.169 29.164
Average.....	9	46.63	17.73	3.49	77	2.18	9.50	55	3.67	3.97	9.8	.929	.204 29.117
March.....	9	30.91	16.61	1.89	80	1.18	10.50	57	4.06	4.42	11.1	1.147	.250 29.114
April.....	9	45.55	a 18.80	2.91	b 73	1.82	9.86	b 52	3.77	4.26	10.5	1.000	.209 a 29.127
January.....	8	22.68	14.50	1.48	84	.93	10.75	72	3.86	b 3.92	10.4	1.260	.287 29.105
February.....	8	22.17	16.11	1.45	83	.91	10.77	66	3.98	4.42	11.0	1.278	.285 29.110
November.....	8	36.69	13.80	2.35	81	1.47	10.21	69 b	3.23	b 3.48	11.0	1.109	.248 a 29.127
December.....	8	27.46	12.90	1.73	83	1.08	10.60	72 b	3.63	4.03	11.2	1.101	.258 29.114
October.....	7	a 49.49	17.69	3.47	77	2.17	9.51	b 53 b	3.27	b 3.44	9.8	.974 b	.202 a 29.143

* † a, b. These footnotes are under Exhibit IV.

WARM WEATHER DISEASES.

EXHIBIT XXXI.—Summary relative to Exhibits XXI to XXX, inclusive. Showing the months in which the diseases were more or less prevalent than usual, and the number of months in which the propositions relative to "Climate and Sickness" held true.

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent.	Months (inclusive) in which diseases named were less than usually prevalent.	For the 12 months of the average year. Number of months in which propositions hold true.*												
			That in mos. when diseases named were more pre- valent than usual the conditions named below were higher than usual, and in months when the diseases were less pre- valent than usual these conditions were lower than usual.						That in months when diseases named were more prevalent than usual, the conditions named below were less than usual, and in months when the diseases were less prevalent than usual these conditions were greater than usual.						
			Average temperature.	Average daily range of temperature.	Absolute humidity.	Average daily atmospheric pressure.	Atmos- pheric pressure. Range.	Monthly.	Av. daily.	Relative humidity.†	Average per cent of cloudi- ness.	Ozone.	Day.	Night.†	Velocity of wind.†
Diarrhea.....	July-October.....	Jan.-June, Nov., Dec.	10	8	9	9	9	9	10	8	9	9	9	9	9
Cholera morbus.....	July-September....	Jan.-June, Oct.-Dec.	9	9	10	8	10	9	9	8	8	8	8	8	9
Cholera infantum.....	July-October.....	Jan.-June, Nov., Dec.	10	8	9	9	9	10	8	9	9	9	9	9	9
Dysentery.....	July-October.....	Jan.-June, Nov., Dec.	10	8	9	9	9	10	8	9	9	9	9	9	9
Inflammation of bowels...	June-October.....	Jan.-May, Nov., Dec.	11	9	10	8	10	11	9	9	9	9	8	8	10
Typhoid fever.....	August-December..	January-July.....	7	5	6	10	7	7	5	6	6	10	8	6	
Intermittent fever.....	April-October.....	Jan.-Mar., Nov., Dec.	11	11	10	8	7	11	11	12	6	6	6	10	
Remittent fever.....	July-November....	Jan.-June, Dec....	9	7	8	10	8	9	7	8	10	10	10	8	
Measles.....	February-July....	Jan., Aug.-Dec....	6	8	7	3	7	6	7	7	3	2	6		
Whooping-cough.....	May-September....	Jan.-April, Oct.-Dec.	11	11	12	6	12	11	10	10	6	6	11		

*When not otherwise specified, the figures in each of these eleven columns show for how many months out of the twelve months the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in eight months out of the twelve; that relative to absolute humidity, nine months out of the twelve, etc. Most of the warm weather diseases usually reach a maximum prevalence about one month later than the warmest month, and the changes in prevalence usually follow about a month later than the changes in temperature.

†The figures in these columns are the number of months in which the propositions held true in periods of eleven months, because in one month out of the twelve, the meteorological condition, named at the head of the column, was neither more nor less prevalent than the average.

**COMMUNICABLE DISEASES IN MICHIGAN DURING THE
YEAR ENDING DECEMBER 31, 1904, AND IN
PRECEDING YEARS.**

INTRODUCTION.

This article is the twenty-fourth in a series upon the same general subject, begun in 1882. It presents a summary of the compilation of the reports received from health officers relative to certain communicable diseases in Michigan during the year 1904, together with a review of some of the information obtained from similar compilations in preceding years. The most dangerous diseases are treated in detail in the order of their importance as causes of deaths, as shown by the diagram below:

DEATHS IN MICHIGAN 6 YEARS, 1898-1903.

PNEUMONIA

TUBERCULOSIS

MENINGITIS

TYPHOID FEVER

DIPHTHERIA

WHOOPING-COUGH

SCARLET FEVER

MEASLES

SMALLPOX

[PLATE 1222]

The statistical study of pneumonia has not, heretofore, been attempted by this Department because, prior to January 1, 1904, health officers were not required to make reports of this disease, and, consequently, but few and incomplete reports were received.

SOME OF THE PURPOSES OF THIS COMPILATION.

In the law establishing the State Board of Health, the Secretary of the Board is required to collect information concerning vital statistics and knowledge respecting diseases, and to disseminate such information among the people. In compliance with this requirement, it has heretofore been the custom to collect, compile, tabulate and publish informa-

tion relative to the causes, and methods of prevention and restriction, of the dangerous communicable diseases, under the following general heads: The diseases which cause the most sickness and deaths; The general prevalence of each disease; The methods of communication, periods of incubation and duration of sickness, of each disease; The season of the year when each disease is usually most prevalent or likely to be contracted; The ages at which persons usually die from or are liable to contract these diseases; The comparative susceptibility of the sexes to contraction of each disease; The localities in this State where the several diseases are known to be the most prevalent; The comparative prevalence of each disease in urban and rural districts; The death rates and sickness rates of each disease; The prevention and restriction of each disease by isolation and disinfection, coupled with vaccination in small-pox and antitoxin treatment in diphtheria, and The beneficial results of preventive and restrictive measures.

For the reason that the information already obtained from the study of certain phases of these diseases during a long series of years is believed to be sufficient for the purposes of this compilation, departures have been made in this article from the usual form of the tabular work in similar articles in preceding reports. For example, the period of incubation, duration of sickness, and age influence, of many of the most prominent diseases have been well established, by the statistics of this Department, by contemporaneous observations in other departments of public health work, and by medical and scientific research. The study of these phases of many of the diseases for the single year 1904 has therefore been omitted, and summaries of the preceding compilations tabulated instead.

METHODS OF COMPILATION.

With the exception of pneumonia, consumption and meningitis, which have been studied by individual cases, the diseases have been compiled by outbreaks, as defined in the following paragraph:

An *outbreak* is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak.

GENERAL PLAN OF THE REPORTS.

Upon the receipt of information at this office that tuberculosis, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis, smallpox, German measles (rötheln), rabies or glanders, was present, or had recently been present, in any locality in the State, a letter was sent to the health officer, or, in his absence, to the president of the board of

health, mentioning the reported existence of the disease within his jurisdiction, indicating his duties and powers, and the proper measures to be taken in restricting the disease, transmitting documents of instruction relative to the prevention and restriction of the disease for distribution among the neighbors of families in which the disease is present, and asking for reports relative to the methods employed for the restriction of the disease, the results of efforts for suppressing it, and the number of cases and deaths in each outbreak. With this letter, in each instance, except in the case of rabies and glanders, there was sent a sufficient number of blanks for the preliminary report, and also for weekly reports during the continuance of the outbreak. At the close of each outbreak, a blank for a special final report was sent, and at the close of the year an annual report, covering all the cases and deaths in each outbreak during the year, was asked for on blanks sent from this office.

The information contained in the several reports, together with other correspondence relative to outbreaks of such diseases, are the bases on which the statements made in this article are founded.

SUMMARY OF WORK IN THE OFFICE OF THE SECRETARY FOR THE PREVENTION
AND RESTRICTION OF THE DANGEROUS COMMUNICABLE DISEASES,
DURING THE YEAR 1904.

The number of reports of dangerous communicable diseases received and filed, and the corresponding number concerning which action was taken by this office, during the year, are as follows: For pneumonia, 3,790; for tuberculosis, 2,928; for meningitis, 598; for typhoid fever, 910; for diphtheria, 659; for whooping-cough, 188; for scarlet fever, 838; for measles, 766; and for smallpox, 714. Total for the nine diseases, 11,391.

The number of communications relative to dangerous communicable diseases received and placed on file during the year was 31,084.

The number of communications relative to dangerous communicable diseases sent from this Department during the year was 23,290.

FIRST INFORMATION OF THE OCCURENCE OF COMMUNICABLE DISEASES

To the "outbreak" reports, from the health officers of the localities where communicable diseases occur, this Department is mainly indebted for the first information of such outbreaks. Two other sources from which such information was first obtained during the year 1904, and in preceding years, were the certificates of deaths returned to the State Department, and the local columns of daily and weekly newspapers throughout the State. The extent of the information contributed in 1904, through these channels, may be seen by reference to the accompanying table:

TABLE 1.—*Showing the extent to which the certificates of deaths, returned to the State Department, and the local columns of newspapers, conveyed to the State Board of Health the first information of dangerous communicable diseases in Michigan, during the year 1904.*

Diseases.	Total number of sources from which first information was obtained.*	First information obtained from the death returns.	First information obtained from newspapers.†
Pneumonia.....	3,790	1,273	165
Tuberculosis.....	2,928	1,118	54
Meningitis.....	598	306	6
Typhoid fever.....	910	174	37
Diphtheria.....	659	86	10
Whooping-cough.....	188	61	6
Scarlet fever.....	838	43	17
Measles.....	766	58	58
Smallpox.....	714	1	12
 Totals.....	 11,391	 3,120	 365

*Exclusive of a total of 713 newspaper reports which could not be confirmed.

†Includes only those cases in which the newspaper reports were confirmed.

In many instances the information obtained from the death returns was received too late to enable this Department to be of service in supplying to the health officials, and through them the general public, information relative to the best measures for the restriction of the diseases at the time when such assistance might have proved beneficial. In a majority of instances the delay was occasioned by the neglect of the householder or attending physician to make reports of the sickness to the local health officials, in accordance with the requirements of Sections 4452 and 4453, of the Compiled Laws of 1897.* It is probable that many of the people are yet in ignorance of the law in this particular, and it is suggested to local boards of health that much good would result from the occasional publication, in the local newspapers, of the provisions of the general law, and of any local regulations that may be in force, for the suppression of dangerous diseases.

WEEKLY PREVALENCE OF DANGEROUS COMMUNICABLE DISEASES IN 1904.

In the weekly bulletins, "Health in Michigan," issued by this Department during 1904, the reported prevalence of thirty-one of the most prominent diseases was shown in connection with certain coincident meteorological conditions. The summary of these bulletins, in so far as relates to the nine principal diseases considered in this article, is shown in Table 2, and may be studied in connection with other tables, on subsequent pages, which also show the seasonal prevalence of these diseases, but by monthly periods.

TABLE 2.—Showing the weekly prevalence of each of the most dangerous communicable diseases in Michigan in 1904, together with the departures of the average weekly temperature in 1904 from the averages of corresponding weeks in the seven years, 1897-1903.

Weeks ending.	The numbers of localities at which the diseases were reported present during each week.									Average temperature in 1904 higher (+) or lower (-) than the average of preceding years.—Degrees Fahr.	
	Pneumonia.	Tuberculosis.	Meningitis.	Typhoid fever.	Diphtheria.	Whooping-cough.	Scarlet fever.	Measles.	Smallpox.		
January.....	9	39	180	3	56	51	14	99	39	65	-5.60
	16	35	181	4	48	54	12	102	58	71	-8.28
	23	38	186	3	46	61	10	112	59	87	-5.03
	30	49	189	0	48	55	10	112	64	88	-19.03
February.....	6	56	197	3	49	51	13	104	60	82	-1.86
	13	45	194	3	43	48	12	78	60	75	-11.82
	20	43	201	2	52	46	12	78	65	83	-13.17
	27	59	208	4	50	47	14	83	73	88	-5.44
March.....	5	67	212	5	52	38	12	95	74	85	+2.20
	12	71	214	2	44	39	12	85	77	78	-1.98
	19	103	216	3	43	28	12	85	73	82	-7.19
	26	90	221	3	33	28	9	60	63	75	+1.83
April.....	2	57	224	5	35	32	13	58	77	76	.01
	9	54	223	3	40	24	12	64	89	80	+2.69
	16	57	227	4	45	30	14	68	77	87	-12.68
	23	61	242	2	44	28	13	67	88	97	-7.92
	30	50	250	3	40	29	9	69	100	106	-3.61
May.....	7	61	255	4	37	28	10	64	98	115	+6.65
	14	63	259	1	35	32	11	56	94	114	-4.78
	21	57	262	1	36	33	13	50	92	108	-6.95
	28	57	263	2	40	34	12	48	98	101	+4.34
June.....	4	43	264	3	33	30	9	47	88	110	+2.41
	11	32	264	4	31	29	10	44	84	103	-1.81
	18	27	267	3	36	36	11	44	78	102	+1.85
	25	22	268	2	36	34	13	47	71	88	+3.70
July.....	2	15	273	1	38	27	9	49	59	79	-7.44
	9	6	273	1	35	31	10	40	44	71	-4.94
	16	9	277	2	34	26	11	39	40	78	+3.53
	23	10	274	3	41	20	8	36	38	78	-1.11
	30	8	275	3	44	23	9	30	30	72	-3.76
August.....	6	12	275	1	55	14	10	30	16	71	-.45
	13	9	278	2	72	28	11	39	21	67	-3.61
	20	8	280	2	63	23	14	36	15	58	-.01
	27	9	284	1	77	28	17	33	14	51	-3.03
September.....	3	10	287	5	93	34	12	29	15	42	-3.68
	10	12	292	7	97	37	13	30	14	41	-3.76
	17	13	296	3	108	40	9	38	10	42	-3.24
	24	12	295	2	110	39	8	37	15	41	-2.61
October.....	1	22	296	1	134	26	6	43	14	39	+1.93
	8	14	295	0	117	30	5	48	11	42	-8.33
	15	16	260	1	119	30	7	36	13	42	-1.53
	22	15	255	3	101	38	7	36	13	50	+4.55
	29	15	241	4	106	36	8	40	9	52	-9.65
November.....	5	14	232	1	89	37	8	48	11	50	-.83
	12	13	227	2	91	38	11	61	15	51	-4.43
	19	24	225	1	88	45	5	57	15	48	+5.04
	26	31	226	1	75	48	8	58	22	62	+2.03
December.....	3	40	225	3	81	45	9	61	20	75	-5.68
	10	38	226	3	68	48	8	61	27	70	-6.81
	17	40	230	1	52	52	12	61	29	70	-11.38
	24	33	233	3	49	45	10	63	22	52	+2.19
	31	43	235	0	57	29	8	66	29	61	+4.65

PNEUMONIA IN MICHIGAN IN 1904.

In 1895, pneumonia was added, by the State Board of Health, to the list of dangerous communicable diseases, but active measures for its restriction and prevention were not begun until January, 1904, when the first leaflet on pneumonia was issued by the Board, and copies of the same, together with the necessary blanks for reports of this disease, were mailed to health officers throughout the State.

During the year 1904, information relative to 3,790 cases of pneumonia, including 2,903 deaths, was received at the office of the State Department of Health. Of the total number of deaths, first information relative to 1,630, or 56 per cent of the whole, was obtained principally from health officials, the remaining 44 per cent from the death returns in the Department of State.

From Detroit and Grand Rapids, and probably many other localities, only fatal cases were reported, so that the total number of cases, given above, is far too small.

The failure of many physicians to recognize the necessity for reporting cases of pneumonia under their care to the local health officials, together with the fact that this was the first year in which health officers had been required to report this disease to the State Health Department, may have been responsible for the comparatively small number of reports received. It is believed that subsequent compilations will show results of the educational work of the Department, in more numerous and complete reports of this disease than were received in 1904.

GEOGRAPHICAL DISTRIBUTION.

In the consideration of this phase of the study of pneumonia, the State was divided into eleven geographical divisions,* the counties in each of which would be likely to have somewhat similar climatic conditions. Judging from the death rates of the several divisions, shown in Table 3, pneumonia was most prevalent in the Southeastern Division and least prevalent in the Northern Central Division. Arranging the divisions in the order of greatest death rates per 100,000 of the population, we have the Southeastern (143.2), Upper Peninsula (121.6), Western (120.5), Northern (116.6), Southern Central (109.1), Central (105.1), Bay and Eastern (104.1), Northeastern (96.1), Northwestern (93.2), Southwestern (90.7), and Northern Central (89.5). The counties having the highest and lowest death rates were Roscommon (346.6) and Presque Isle (36.8). From Lake County no report of pneumonia was received during the entire year.

*The boundaries of the several divisions may be seen by reference to the annual report of the Michigan Department of Health for 1886, pages 201 and 217.

TABLE 3.—*The geographical distribution of pneumonia in Michigan in 1904, including the death rates from this disease, per 100,000 population, in each county and division, and for the State as a whole.*

State, division and county.	Population.	Number of:—		Death rates.
		Cases.*	Deaths.†	
State.....	2,530,016	3,790	2,903	114.7
UPPER PENINSULAR DIVISION.				
Alger county.....	6,535	14	11	168.3
Baraga county.....	5,104	5	5	97.9
Chippewa county.....	22,125	24	23	104.0
Delta county.....	27,034	56	48	177.6
Dickinson county.....	18,936	12	13	68.7
Gogebic county.....	17,297	16	14	80.9
Houghton county.....	70,625	134	114	161.4
Iron county.....	8,925	3	4	44.8
Keweenaw county.....	4,546	15	4	88.0
Luce county.....	3,882	3	3	77.3
Mackinac county.....	8,247	7	7	84.9
Marquette county.....	40,010	65	43	107.5
Menominee county.....	26,465	41	33	124.7
Ontonagon county.....	7,166	22	6	83.7
Schoolcraft county.....	8,628	9	7	81.1
NORTHWESTERN DIVISION				
Benzie county.....	10,790	11	11	101.9
Grand Traverse county.....	23,202	28	18	77.6
Leelanau county.....	10,826	8	6	55.4
Manistee county.....	27,173	46	27	99.4
Wexford county.....	19,217	37	23	119.7
NORTHERN DIVISION.				
Antrim county.....	83,782	148	100	116.6
Charlevoix county.....	15,655	30	32	204.4
Cheboygan county.....	16,278	27	15	92.1
Crawford county.....	17,256	35	16	92.7
Emmet county.....	3,354	9	3	77.8
Kalkaska county.....	17,892	21	17	95.0
Otsego county.....	7,608	10	6	78.9
Presque Isle county.....	7,239	16	11	152.0
NORTHEASTERN DIVISION.				
Alcona county.....	61,368	73	59	96.1
Alpena county.....	5,684	8	4	70.4
Iosco county.....	19,748	23	20	101.3
Montmorency county.....	10,540	10	9	85.4
Ogemaw county.....	3,515	8	5	142.2
Oscoda county.....	9,121	18	15	164.5
Presque Isle county.....	1,888	2	2	105.9
10,872	4	4	36.8	
WESTERN DIVISION.				
Kent county.....	278,805	397	336	120.5
Lake county.....	135,488	230	202	145.9
Mason county.....	4,990	0	0	0
Muskegon county.....	19,608	33	25	127.5
Newaygo county.....	37,373	45	38	101.7
Oceana county.....	18,421	22	13	70.6
Ottawa county.....	17,717	26	25	141.1
42,199	41	33	78.2	
NORTHERN CENTRAL DIVISION.				
Clare county.....	107,378	160	96	89.5
Gladwin county.....	9,189	16	7	76.2
Isabella county.....	8,001	8	6	60.8
Merida county.....	24,106	31	24	99.6
Midland county.....	20,216	36	20	98.9
Muskegon county.....	14,636	16	13	88.3
Oceola county.....	10,266	9	7	68.2
Roscommon county.....	18,633	25	13	69.8
1,731	16	6	346.6	

TABLE 3.—CONCLUDED.

Division and county.	Population.	Number of:—		Death rates.
		Cases.*	Deaths.†	
BAY AND EASTERN DIVISION.				
Arenac county.....	347,763	511	362	104.1
Bay county.....	10,184	14	14	137.5
Huron county.....	63,448	98	68	107.2
Lapeer county.....	34,945	21	22	63.0
Saginaw county.....	27,050	63	38	140.5
Sanilac county.....	85,671	107	88	102.7
St. Clair county.....	34,867	49	33	94.6
Tuscola county.....	55,637	90	56	100.7
	35,961	69	43	119.6
CENTRAL DIVISION.				
Barry county.....	315,082	495	331	105.1
Clinton county.....	22,025	33	24	109.9
Eaton county.....	25,208	40	16	63.5
Genesee county.....	30,706	80	50	162.5
Gratiot county.....	42,753	79	55	135.7
Ingham county.....	30,536	27	23	75.3
Ionia county.....	43,007	79	47	107.8
Livingston county.....	34,627	56	40	115.5
Montcalm county.....	18,649	22	13	69.7
Shiawassee county.....	33,260	35	29	87.2
	33,711	44	21	92.0
SOUTHWESTERN DIVISION.				
Allegan county.....	143,333	185	130	90.7
Berrien county.....	38,948	49	42	107.8
Cass county.....	49,390	54	37	74.9
Van Buren county.....	20,030	22	12	59.9
	34,965	60	39	111.5
SOUTHERN CENTRAL DIVISION.				
Branch county.....	325,183	526	355	109.1
Calhoun county.....	26,397	31	26	98.5
Hillsdale county.....	52,963	92	68	128.4
Jackson county.....	29,837	43	31	103.9
Kalamazoo county.....	47,122	139	68	144.3
Lenawee county.....	49,762	89	55	110.5
St. Joseph county.....	49,097	56	42	85.5
Washtenaw county.....	23,229	21	21	90.4
	46,776	55	44	94.1
SOUTHEASTERN DIVISION.				
Macomb county.....	498,589	739	714	143.2
Monroe county.....	33,095	44	29	87.6
Oakland county.....	32,921	52	48	145.8
Wayne county.....	45,746	59	46	107.6
	386,827	584	591	152.8

*From Detroit and Grand Rapids, and probably many other localities, only fatal cases were reported, so that the figures in this column may not, in many instances, represent the entire number of cases which occurred.

†Many fatal cases began in 1903.

LOCAL PREVALENCE.

Of the 1,630 incorporated localities in Michigan in 1904, 974, or about 60 per cent, were, at some time during the year, infected with pneumonia. As shown in Table 4, the greatest prevalence occurred in the cities and villages—urban localities—the death rate being 126.8 per 100,000, as compared with 101.1 per 100,000 in the townships—rural localities. To determine what, if any, influence density of population had on the prevalence of pneumonia, the cities and villages have been divided into five groups, the death rate in each group being as follows: Cities over 50,000 population, 153.2 per 100,000; cities from 25,000 to

50,000, 108.2 per 100,000; cities, and Calumet township, from 10,000 to 25,000, 123.6 per 100,000; cities and villages from 5,000 to 10,000, 113.7 per 100,000; and cities and villages under 5,000, 112 per 100,000. By this it may be seen that, with the exception of the second group, the death rate was highest in the large cities, and proportionately less in the smaller cities and villages.

TABLE 4.—*The prevalence of pneumonia in urban and rural localities in Michigan in 1904.*

Localities—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.*	Deaths.	Death rates per 100,000 of the population.
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	607	633	153.2
Cities from 25,000 to 50,000.....	129,336	4	4	100	199	140	108.2
Cities from 10,000 to 25,000 and Calumet township, 17,150.....	266,888	19	19	100	431	330	123.6
Cities and villages from 5,000 to 10,000.....	139,370	21	21	100	205	159	113.7
Cities and villages under 5,000.....	397,332	367	213	58	666	445	112.0
Total urban.....	1,346,735	413	259	63	2,108	1,707	126.8
Rural (townships†).....	1,183,281	1,217	715	59	1,682	1,196	101.1

*This footnote is below Table 3, on a preceding page.

†Not including Calumet, which, for the purposes of this study, is classed with urban localities having corresponding populations.

As indicated by the death rates, the larger cities and villages in which pneumonia was much more prevalent than the average for the entire State in 1904 (114.7 per 100,000 of the population) were: Monroe (with a death rate of 244.8 per 100,000), Hancock (231.9), Escanaba (225.3), Wyandotte (202.8), Marquette (196.9), Menominee (189.3), Woodmere (178.7), Cadillac (174.1), West Bay City (169.3), Pontiac (165.4), Grand Rapids (155.7), Detroit (152.4), Delray (150.9), Battle Creek (148.6), Coldwater (144.6), Jackson (138.4), Flint (134.4), St. Joseph (131.5), and Ludington (124.0).

SEASONAL PREVALENCE.

Judging from the numbers of persons who were taken sick and who died in each month in 1904, as shown in Table 5, pneumonia was most prevalent in the month of February, and least prevalent in the month of August. By the Secretary of State's Vital Statistics of Michigan, it appears that during the six years, 1898-1903, the greatest number of deaths from pneumonia occurred in the months of February and March, and the smallest number in August. The months of greatest prevalence are from December to May, both inclusive.

TABLE 5.—*The seasonal prevalence of pneumonia in Michigan, as indicated by the sickness and deaths from this disease in 1904, and by the average numbers of deaths in the six years, 1898-1903.*

Years		Year.	Jan.	Feb.	Mar.	April.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.	
			3,167	545	562	438	361	296	120	71	50	91	116	196	320
1898- 1903	1904.	Number of persons taken sick*.....													
	1904.	Number of deaths.....	2,913	433	511	461	318	287	147	76	51	91	126	159	253
		Average number of deaths†.....	2,510	332	381	381	326	229	118	70	63	78	116	161	250

*The months in which some of the cases began were not reported.

^fThis average is computed from the Secretary of State's Vital Statistics of Michigan.

INFLUENCE OF AGE.

The ages of those taken sick with pneumonia in 1904 were stated in 3,656 instances, and of this number 20 per cent were under one year of age; 32 per cent under 5 years; 48 per cent between the first and twenty-fourth years; 18 per cent from 25 to 49 years; 24 per cent from 50 to 74 years; and 11 per cent 75 years and over.

In the case of those who died from pneumonia, the ages were stated in 2,872 instances, and of this number 24 per cent were under one year; 37 per cent under 5 years; 47 per cent between the first and twenty-fourth years; 15 per cent from 25 to 49 years; 25 per cent from 50 to 74 years; and 13 per cent 75 years and over.

The numbers and per cents of cases and death, by one year periods from 0 to 5 years, and by five year periods from 5 to 75 years, are contained in Table 6.

TABLE 6.—*The influence of age in pneumonia, as shown by the number and per cent of cases and deaths from this disease, in Michigan, in 1904, in certain age groups.*

Ages in groups of years.	All known ages.	0-1	1-2	2-3	3-4	4-5	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75 and over
Number of cases.....	3,656	716	247	98	66	49	1,176	149	104	169	148	132	125	111	134	143	142	157	182	186	195	403
Per cent the cases in each group were of all cases of known ages.....	100	19.6	6.8	2.7	1.8	1.3	32.2	4.1	2.8	4.6	4.0	3.6	3.4	3.0	3.7	3.9	3.9	4.3	5.0	5.1	5.3	11.0
Number of deaths.....	2,872	686	219	73	37	33	1,048	71	42	83	92	87	84	72	94	97	107	135	145	162	174	379
Per cent the deaths in each group were of all deaths of known ages.....	100	23.9	7.6	2.5	1.3	1.1	36.5	2.5	1.5	2.9	3.2	3.0	2.9	2.5	3.3	3.4	3.7	4.7	5.0	5.6	6.1	13.1
Per cent the deaths in special groups were of all deaths of known ages.....							36.5					46.5					15.1		25.2			13.1

INFLUENCE OF AGE AND SEX.

The average age of non-fatal cases was for males 27.1 years, and for females 29.9 years.

The average age of fatal cases was for males 31.7, and for females 35.1 years.

Thirty-eight per cent of the males and 34 per cent of the females who died, and 16 per cent of the males and 17 per cent of the females, who recovered, were under five years of age.

Eleven per cent of the males and 16 per cent of the females who died, and 3 per cent of the males and 4 per cent of the females who recovered, were over 74 years of age.

Between the ages of 4 and 75 years, the fatality was slightly higher and the recoveries about 2 per cent more numerous, in the males than in the females.

The per cents of fatal and non-fatal cases, by five year age periods, both male and female, are shown in Tables 7 and 8.

TABLE 7.—*The influence of age and sex in pneumonia, as shown by the per cent of persons, in certain age groups, who died from this disease in Michigan, in 1904.*

Sex.	Average age, in years.	No. of cases included.	Per cent of fatal cases in age periods.																
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	
Males.....	31.7	1,539	100	38.3	1.9	1.1	3.2	3.5	2.5	3.2	2.9	3.9	4.0	4.3	4.9	4.6	5.3	5.2	
Females.....	35.1	1,333	100	34.4	3.1	1.9	2.6	2.9	3.7	2.6	2.0	2.6	2.6	3.1	4.5	5.6	6.1	7.1	15.5

TABLE 8.—*The influence of age and sex in pneumonia, as shown by the per cent of persons, in certain age groups, who recovered from this disease in Michigan, in 1904.*

Sex.	Average age, in years.	No. of cases included.	Per cent of non-fatal cases in age periods.																
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	
Males.....	27.1	170	100	15.7	8.9	8.3	13.0	8.9	5.3	5.1	6.0	5.5	5.3	4.5	3.0	3.6	1.9	2.3	2.6
Females.....	29.9	314	100	17.2	11.5	7.3	8.0	4.5	6.4	5.4	3.5	4.5	6.7	4.5	2.5	6.4	4.8	3.2	3.8

DURATION OF FATAL AND NON-FATAL CASES.

The average duration of fatal cases was for males 8.6 days, and for females 8.8 days.

The average duration of non-fatal cases was for males 16 days, and for females 16.9 days.

Of the fatal cases, the greatest numbers of deaths, both male and female, occurred between the fifth and eleventh days; the next greatest

number before the sixth day; and the next, between the tenth and sixteenth days.

Of the non-fatal cases, the greatest number of recoveries, both male and female, took place between the tenth and twenty-first days.

The per cents of deaths and recoveries, both male and female, in five day periods, are shown in Tables 9 and 10.

TABLE 9.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from pneumonia, in Michigan, in 1904.*

Sex.	Average duration of fatal cases.*	Number of fatal cases included.	Duration of sickness.—Per cent of deaths in each period of days.								
					6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 and over.	
			All cases.	1 to 5 days.							
Male.....	8.6	1,258	100	30.0	39.5	16.7	5.3	3.0	1.7	3.7	
Female.....	8.8	1,071	100	29.7	43.4	14.9	6.2	3.9	1.9	5.5	

* Average 1 to 30 days, inclusive.

TABLE 10.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from pneumonia, in Michigan, in 1904.*

Sex.	Average duration of non-fatal cases.*	Number of non-fatal cases included.	Duration of sickness.—Per cent of non-fatal cases in each period of days.								
					6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 and over.	
			All cases.	1 to 5 days.							
Male.....	16.0	390	100	1.8	12.8	26.4	25.6	13.3	5.1	14.9	
Female.....	16.9	262	100	2.3	11.1	25.2	26.0	19.5	7.3	8.8	

* Average 1 to 30 days, inclusive.

PREDISPOSING INFLUENCES.

In reply to the question, "Did this disease begin as a 'bad cold,' influenza, bronchitis, or as pneumonia?" 1,074 cases were reported to have begun as a "bad cold;" 167 cases following exposure; 166 cases following influenza; and 120 cases following bronchitis.

These, and other predisposing influences, are shown in Table 11.

In this connection it may be stated that in seven instances a second attack occurred in the same person in periods ranging from 1 to 5 years, and in one instance a third attack occurred in the same person within 5 years.

TABLE 11.—*For the year 1904, in 1,619 instances, pneumonia was reported to have begun as follows:*

As a bad cold in.....	1,074 instances.
Following exposure.....	167 instances.
Following influenza.....	166 instances.
Following bronchitis.....	120 instances.
Following measles.....	28 instances.
Following whooping-cough.....	13 instances.
Following chill.....	8 instances.
Following tonsillitis.....	6 instances.
Following injury.....	6 instances.
Following pleurisy.....	6 instances.
Following confinement.....	5 instances.
Following typhoid fever.....	4 instances.
Following congestion.....	3 instances.
Following diphtheria.....	2 instances.
Following croup.....	2 instances.
Following apoplexy.....	2 instances.
Following malarial fever.....	1 instance.
Following chronic nephritis.....	1 instance.
Following catarrh of stomach.....	1 instance.
Following asthma.....	1 instance.
Following dropsy.....	1 instance.
Following jaundice.....	1 instance.
Following cholera infantum.....	1 instance.

REPORTED SOURCES OF CONTAGIUM.

The information contained in the reports of health officers relative to the sources of the contagium in pneumonia is very meagre, probably on account of the difficulty met with in tracing cases of this disease to their source.

Out of 64 cases, about the source of which definite statements were made, 39 were reported as contracted while nursing, or otherwise coming in contact with pneumonia patients.

Other reported sources of contagium are shown in Table 12.

TABLE 12.—*Reported sources of contagium in 72 cases of pneumonia, in Michigan, in 1904.**

Reported source.	Cases.
Contracted while nursing, or otherwise coming in contact with pneumonia patients.....	39
Probably from a former case.....	7
From outside jurisdictions.....	5
Atnospheric influence.....	4
Insanitary surroundings.....	3
Debilitated condition.....	3
Old age.....	2
Result of an operation.....	2
Probably from infected house.....	1
Handling mail.....	1
Myocarditis.....	1
Palsy.....	1
Following lodgment of a timothy head in bronchial tube	1
By small kernel of corn in trachea.....	1
Contracted tonsillitis from mother and eleven days later contracted pneumonia.....	1

* In a large majority of instances the source of the contagium was not stated, or reported as unknown.

PERIOD OF INCUBATION.

By reason of the difficulty experienced in locating individual sources of contagium, and, by this means, the time of exposure to the disease, the period of incubation is not easy to determine. As indicating the probable average period of incubation in 1904, it may be stated that, in the majority of instances, the time which elapsed between certain cases and recent previous cases in the same families was seven days.

The periods of time between the occurrence of seventy-six cases of pneumonia in 1904 and previous cases in the same families is shown in Table 13.

TABLE 13.—*The reported periods of time which elapsed between the occurrence of seventy-six cases of pneumonia in 1904 and previous cases in the same families.**

Periods of time.	Number of instances.	Periods of time.	Number of instances.
12 hours.....	1	27 days.....	1
1 day.....	3	1 month.....	2
2 days.....	4	1 month, 15 days.....	2
3 days.....	3	2 months.....	1
4 days.....	6	3 months.....	1
5 days.....	1	5 months.....	1
6 days.....	3	8 months.....	1
7 days.....	8	11 months.....	1
8 days.....	2	1 year.....	15
9 days.....	1	1 year, 7 months.....	23
10 days.....	1	2 years.....	8
11 days.....	3	3 years.....	3
19 days.....	1	3 years, 6 months.....	1
21 days.....	2	4 years.....	1
22 days.....	1	5 years.....	15

*In addition to these 76 cases, three cases were reported as having occurred at the same time as other cases in the same families, and twelve cases as having occurred in the same families at periods ranging from 6 to 26 years previously. In ten instances the time was not stated.

†In two instances a second attack in the same person.

‡In one instance, a second attack in the same person.

§In three instances, a second attack in the same person.

¶In one instance, a second attack in the same person; and in one instance, a third attack in the same person in the five years.

INFLUENCE OF OCCUPATION.

The occupations of pneumonia patients in 1904 were given in 1,561 instances, and of this number at least 1,189 were engaged in occupations which, it is believed, exposed them, or rendered them susceptible, to this disease.

Heading the list are those engaged in housework—housewives, housekeepers and domestics—to the number of 559, many of whom spend a considerable portion of their time in ill ventilated and dust laden rooms.

Dirt—often contaminated with infected sputum—carried into the home on the shoes and skirts, and disseminated throughout the rooms by air currents, or by the periodical sweeping and dusting, is generally believed to play a very important part in the spread of pneumonia, and other diseases of the respiratory organs.

Next in order are the farming class, to the number of 371, who, though naturally a hardy race, and living under conditions which tend to health and vigor, seem to be very susceptible to this disease.

A possible reason for this anomalous condition may be found in the statement made by Robert Hessler, A. M. M. D., of Logansport, Indiana,* and based upon observations extending over many years, that people living in the country, and who are healthy during the greater portion of the year, often become suddenly ill from what he has termed "Dust disease," after going to town and inhaling the sputum contaminated atmosphere of the streets, the frequency and violence of the attacks being greatest in the spring and fall, especially during high winds and when sprinkling of the streets is not being carried out.

Next in order are the laboring class, with 179 cases, and next to them the student class—principally young children of school age—with 80 cases.

The methods and media by which pneumonia is spread being substantially the same as in the case of tuberculosis, it can scarcely be considered a remarkable coincidence that the occupations before-mentioned are found to head the list—practically in the same order—of occupations of persons sick with tuberculosis in each of the nine years, 1896-1904.

A complete list of the occupations of pneumonia patients, as reported in 1904, may be found in Table 14.

*American Medicine, October 1, 1904.

TABLE 14.—*Occupations of pneumonia patients reported in 1904, in 1,561 instances.*

Housewife.....	442	Cigar maker.....	4	Prison guard.....	1
Farmer.....	371	Milliner.....	3	Capitalist.....	1
Laborer.....	179	Physician.....	3	Cattle buyer.....	1
Student*.....	80	Peddler.....	3	Asylum attendant.....	1
Housekeeper.....	66	Hotel keeper.....	3	Butter maker.....	1
Domestic.....	51	Mail carrier.....	3	Bean picker.....	1
Merchant.....	46	Agent.....	3	Hunter.....	1
Carpenter.....	28	Barber.....	3	Tailor.....	1
Mechanic.....	20	Washerwoman.....	3	Farmer and lumberman.....	1
Store clerk	20	Sailor.....	3	Lumberman.....	1
Office clerk.....	18	Contractor.....	3	Farmer and merchant.....	1
Teamster.....	16	Cabinetmaker.....	2	Bridge contractor.....	1
Miner.....	12	Harnessmaker.....	2	Speculator.....	1
Painter.....	10	Hotel porter.....	2	Notary.....	1
Machinist.....	10	Real estate man.....	2	Soldier.....	1
Blacksmith.....	10	Liveryman.....	2	Surface foreman.....	1
Railroad man.....	10	Justice of the peace.....	2	Stone cutter.....	1
School teacher.....	8	Janitor.....	2	Street car conductor.....	1
Gardener.....	7	Lawyer.....	2	Well digger.....	1
Woodsman.....	7	Seamstress.....	2	Surveyor.....	1
Nurse.....	7	Factory foreman.....	2	Printer.....	1
Factory employee.....	6	Tanner.....	2	Lather.....	1
Mason.....	6	Dressmaker.....	2	Cooper.....	1
Travelling man.....	6	Nightwatchman.....	2	Music teacher.....	1
Salesman.....	6	Laundryman.....	1	Marine engineer.....	1
Shoemaker.....	5	Dentist.....	1	Musician.....	1
Cook.....	5	Farmer and carpenter.....	1	Theatrical man.....	1
Minister.....	5	Manufacturer.....	1	Bookbinder.....	1
Baker.....	5	Woodworker.....	1	Midwife.....	1
Bartender.....	4	Circuit Court judge.....	1		

*Principally young children attending school.

RESTRICTIVE AND PREVENTIVE MEASURES.

By reference to Table 15 it will be seen that of the total number of cases of pneumonia in 1904, but 698, or 18 per cent, were isolated from all persons except nurses and attending physicians; in 1,191 instances, or 31 per cent of the whole number, the sputa was disinfected or destroyed; and in 987 instances, or 26 per cent of the whole number, the rooms occupied by pneumonia patients were disinfected.

In very many instances, isolation and disinfection were neglected because of the failure of the attending physician or householder to notify the health officer until too late to be of service.

The necessity for prompt and thorough isolation and disinfection in pneumonia cases is well recognized, and urged upon health officials in this State.

TABLE 15.—*Restrictive and preventive measures, in pneumonia, in Michigan, in 1904.*

Number of instances in which isolation was practiced.....	698
Number of instances in which isolation was incomplete, not attempted, or statements relative to same lacking.....	3,092
Number of instances in which the sputa was disinfected.....	1,191
Number of instances in which the rooms occupied by patients were disinfected.....	987
Number of instances in which the disinfection was not thorough.....	632
Number of instances in which disinfection was neglected:—	
a. Of the sputa.....	2,600
b. Of infected rooms.....	2,172

TUBERCULOSIS IN MICHIGAN IN 1904 AND PRECEDING YEARS.

During the year 1904, tuberculosis was reported present at 909 incorporated health jurisdictions in this State, with an aggregate of 2,928 cases, including 2,515 deaths.

There were still sick at the close of the year 285 persons, of whose sickness information had been received by this Department from time to time during the year. There were also a number of persons still sick at various times during the year, but of whom the Department received no information at the close of the year. Some of them may have recovered prior to December 31.

By reason of the fact that many cases of this disease are of long duration, and in some stages of the disease not under the care of a physician, the number of reports received by this Department are believed to be considerably less than the actual number of cases which occurred.

From many localities the deaths only from tuberculosis are reported; therefore the apparent rates of deaths to cases are much too high.

In this article, the deaths reported to the Secretary of State are used in the several tables in conjunction with those reported to this Department.

THE GENERAL PREVALENCE OF TUBERCULOSIS.

The compilation of information relative to the prevalence of tuberculosis in Michigan was made for the first time in 1893, but from that time to 1898, when the new law for the registration of deaths took effect, the reports were much less than the actual numbers of cases and deaths which occurred. Hence the reason for commencing Table 16 with the year 1898.

TABLE 16.—*The prevalence of tuberculosis in Michigan in each of the seven years, 1898-1904.*

Years.	Population.	Number of cases.*	Number of deaths.	Deaths per 100,000 population.
1898.....	2,389,393†	3,041	2,728	114.2
1899.....	2,426,331†	2,975	2,516	103.7
1900.....	2,420,982	2,721	2,221	91.7
1901.....	2,448,241†	2,915	2,344	95.7
1902.....	2,475,499†	2,658	2,185	88.3
1903.....	2,502,758†	2,745	2,319	92.7
1904.....	2,530,016	2,928	2,515	99.4
Annual averages, 1898-1904.....	2,456,174	2,855	2,404	97.9

*From Detroit and Grand Rapids, and probably many other localities, only the fatal cases were reported, so that the figures in this column do not represent the number of cases which actually occurred.

†Estimated.

The number of deaths from pulmonary tuberculosis per 100,000 persons living, reported to the Secretary of State during the twenty-nine years ending with 1897, probably quite accurately represents the annual fluctuations of, but not the total deaths from, this disease. It may be seen that, compared with any previous year, there was a remarkable and unprecedented decrease in the death rate from this disease in 1891, and the decrease occurred at a time when influenza was epidemic in the country. Statistics for the Eastern States at that time showed an increase in the death rates from tuberculosis, which increase was attributed to the influence of the epidemic influenza.

The decrease in tuberculosis in Michigan has apparently resulted from the education of the people generally to a knowledge that tuberculosis is a dangerous communicable disease, which may easily be restricted. It is one more forcible illustration of the fact that "Knowledge is Power." Knowledge of the modes whereby tuberculosis is usually spread, and of the ease with which its spread may be lessened, by the destruction or disinfection of all infected sputa, has apparently supplied a "power" which has caused an unprecedented reduction in the death rate from tuberculosis. The extent of the "campaign of education" which, in Michigan, began in 1880, and which took on an especially vigorous activity in 1891, can hardly be realized without a study of its history; but the apparent results of that educational movement are exceedingly plain to be seen from Table 17.

Some of the reasons for believing that the decrease in the death rate from tuberculosis has been due to the popular education in the way the disease is usually spread, and in the way to restrict the disease, are: 1. The disease was under observation for many years before that knowledge became general, and (as shown by Table 17) it did not decrease; the decrease has been nearly coincident with the education, lagging behind somewhat at the outset, and gradually increasing later, as it would be

expected to do if caused by the popular education. 2. Precisely similar decrease occurred in Michigan in the death rate from scarlet fever and from other diseases, coincident with systematic popular education in the ways those diseases are usually spread, and in the best measures for their restriction. 3. The decrease in the mortality from tuberculosis has, apparently, been greatest in those States where systematic popular education for its restriction has been most general and active. 4. There is no other known cause capable of producing such a gradually increasing effect as is shown to have occurred.

TABLE 17.—*The number of reported deaths from tuberculosis of the lungs per 100,000 persons living, in Michigan, in each of the 29 years, 1869-1897. Compiled from reports to the Secretary of State.*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.9	106.1	105.6	111.7
Year	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Deaths.....	116.1	104.4	112.3	120.8	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2
Year.	1893.	1894.	1895.	1896.	1897.							
Deaths.....	97.7	98.4	105.1	90.4	80.6							

GEOGRAPHICAL DISTRIBUTION OF TUBERCULOSIS IN THE SEVEN YEARS, 1898-1904.

By Table 18 it may be seen that, as indicated by the average death rates for the entire State (shown in Table 16), the disease was much more prevalent than the average in the counties of Mackinac, Roscommon, Grand Traverse and Wayne.

In a lesser degree, the disease was more prevalent than the average in the counties of Macomb, Keweenaw, Kent, Delta, Houghton, Leelanau, St. Joseph, Alcona, Mason, Kalamazoo, Ontonagon, Benzie, Muskegon, Marquette, Washtenaw, Emmet, Berrien, Shiawassee, Ionia, Monroe and Lake.

It was considerably less prevalent than the average in the counties of Presque Isle, Iron, Missaukee, Gladwin, Oscoda, Schoolcraft, Arenac, Otsego, Crawford, Ogemaw, Clare, Antrim, Kalkaska, Newaygo, Barry, Lapeer, Alpena, St. Clair, Ingham, Cheboygan and Huron.

By geographical divisions, the disease was more prevalent than the average in the Southeastern, Western, Northwestern, and Upper Peninsular divisions; and less prevalent than the average in the Southern Central, Southwestern, Central, Bay and Eastern, Northern, Northern Central and Northeastern divisions.

TABLE 18.—*The geographical distribution of tuberculosis in Michigan in the seven years, 1898-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living in each geographical division.*

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	259,693	339	256	98.6
Alger county.....	5,901	7	5	84.7
Barrage county.....	4,959	4	4	80.7
Chippewa county.....	20,962	21	19	90.6
Delta county.....	24,951	38	28	112.2
Dickinson county.....	17,592	17	15	85.3
Gogebic county.....	16,474	15	14	85.0
Houghton county.....	64,263	110	72	112.0
Iron county.....	8,702	7	4	46.0
Keweenaw county.....	3,502	4	4	114.2
Luce county.....	3,088	3	3	97.2
Mackinac county.....	7,574	12	12	158.4
Marquette county.....	40,497	56	42	103.7
Menominee county.....	26,281	24	22	83.7
Ontonagon county.....	6,591	15	7	106.2
Schoolcraft county.....	8,336	6	5	59.8
NORTHWESTERN DIVISION.	88,797	116	89	100.2
Benzie county.....	10,525	12	11	104.5
Grand Traverse county.....	21,942	41	27	123.1
Leelanau county.....	10,827	14	12	110.8
Manistee county.....	27,720	30	24	86.6
Wexford county.....	17,783	19	15	84.4
NORTHERN DIVISION.	78,595	80	65	82.7
Antrim county.....	15,706	14	11	70.0
Charlevoix county.....	14,391	17	14	97.3
Cheboygan county.....	16,291	15	13	79.8
Crawford county.....	3,112	3	2	64.3
Emmet county.....	15,737	20	16	101.7
Kalkaska county.....	7,030	6	5	71.1
Otsego county.....	6,328	5	4	63.2
NORTHEASTERN DIVISION.	56,827	49	43	75.7
Alcona county.....	5,613	7	6	106.9
Alpena county.....	19,321	16	15	77.6
Iosco county.....	10,022	10	9	89.8
Montmorency county.....	3,413	3	3	87.9
Ogemaw county.....	7,659	7	5	65.3
Oscoda county.....	1,683	2	1	59.4
Presque Isle county.....	9,116	4	4	43.9
WESTERN DIVISION.	272,400	333	281	103.2
Kent county.....	134,488	182	151	112.3
Lake county.....	5,045	5	5	99.1
Mason county.....	19,666	24	21	106.8
Muskegon county.....	36,374	47	38	104.5
Newaygo county.....	17,921	14	13	72.5
Oceana.....	17,304	16	15	86.7
Ottawa county.....	41,602	45	38	91.3
NORTHERN CENTRAL DIVISION.	104,827	102	84	80.1
Clare county.....	8,681	8	6	69.1
Gladwin county.....	7,039	5	4	56.8
Isabella county.....	23,725	26	20	84.3
Mecosta county.....	20,865	21	19	91.1
Midland county.....	14,984	13	12	80.1
Missaukee county.....	9,591	6	5	52.1
Oseola county.....	18,333	21	16	87.3
Roscommon.....	1,609	2	2	124.3

TABLE 18.—CONCLUDED.

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates,
BAY AND EASTERN DIVISION.	345,646	333	297	85.9
Arenac county.....	9,533	6	6	62.9
Bay county.....	64,026	66	61	95.3
Huron county.....	35,090	31	28	79.8
Lapeer county.....	27,676	26	21	75.9
Saginaw county.....	82,853	83	76	91.7
Sanilac county.....	35,107	35	30	85.5
St. Clair county.....	55,256	50	43	77.8
Tuscola county.....	36,105	36	32	88.6
CENTRAL DIVISION.	316,158	351	286	90.5
Barry county.....	22,651	23	17	75.1
Clinton county.....	25,404	25	21	82.7
Eaton county.....	31,764	35	29	91.3
Genesee county.....	42,147	51	40	94.9
Gratiot county.....	29,837	33	28	93.8
Ingham county.....	41,785	42	33	79.0
Ionia county.....	35,225	42	35	99.4
Livingston county.....	19,387	22	18	92.8
Montcalm county.....	33,825	35	31	91.6
Shiawassee county.....	34,133	43	34	99.6
SOUTHWESTERN DIVISION.	142,820	163	136	95.2
Allegan county.....	39,042	45	36	92.2
Berrien county.....	49,635	56	50	100.7
Cass county.....	20,731	25	19	91.7
Van Buren county.....	33,412	37	31	92.8
SOUTHERN CENTRAL DIVISION.	321,456	397	312	97.1
Branch county.....	26,660	32	25	93.8
Calhoun county.....	51,368	55	48	93.4
Hillsdale county.....	29,547	35	28	93.8
Jackson county.....	47,831	48	43	89.9
Kalamazoo county.....	46,508	80	49	105.4
Lenawee county.....	48,721	50	45	92.4
St. Joseph county.....	23,909	32	26	108.7
Washtenaw county.....	46,612	65	48	103.0
SOUTHEASTERN DIVISION.	468,969	598	560	119.4
Macomb county.....	33,131	45	39	117.7
Monroe county.....	33,207	41	33	99.4
Oakland county.....	44,988	57	44	97.8
Wayne county.....	357,643	455	444	121.4

*This footnote is below Table 16, on a preceding page.

THE PREVALENCE OF TUBERCULOSIS IN URBAN AND RURAL LOCALITIES.

By reference to the figures in Table 19, which show the per cent of infected localities and the death rates, per 100,000 of the population, in 1904, it will be seen that tuberculosis was most prevalent in the large centers of population, particularly in cities of 25,000 and upwards, gradually decreasing with the population.

It may also be seen that the death rates were higher in all localities of more than 5,000 population than the average death rate for the entire State, shown in Table 16.

As indicated by the death rates, the cities in which tuberculosis was much more prevalent than the average for the State in 1904 (99.4 deaths per 100,000 of the population), were: Detroit (with a death rate of

132.2 per 100,000), Grand Rapids (137.9), Bay City (133.8), Jackson (118.6), Kalamazoo (127.6), Saginaw (126.6), Escanaba (252.3), Ish-peming (146.3), Muskegon (134.0), Pontiac (110.3), Sault Ste. Marie (122.4), Traverse City (213.6), Benton Harbor (164.1), Coldwater (112.6), Holland (122.7), Mt. Clemens (168.8), St. Joseph (169.1), and Wyandotte (221.2).

TABLE 19.—*The prevalence of tuberculosis in urban and rural localities in Michigan, in 1904.*

Localities,—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.*	Deaths*	Death rates per 100,000 of the population.
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	572	552	133.6
Cities from 25,000 to 50,000.....	129,336	4	4	100	195	164	126.8
Cities from 10,000 to 25,000 and Calumet township, 17,150.....	266,888	19	19	100	356	271	101.5
Cities and villages from 5,000 to 10,000.....	139,870	21	21	100	179	140	100.1
Cities and villages under 5,000.....	397,332	367	226	62	463	387	97.4
Total urban.....	1,346,735	413	272	66	1,765	1,514	112.4
Rural (townships†).....	1,183,281	1,217	637	52	1,163	1,001	84.6

*This footnote is below Table 16, on a preceding page.

†Not including Calumet, which, for the purposes of this study, is classed with urban localities having corresponding populations.

THE SEASONAL FATALITY OF TUBERCULOSIS.

As a rule, tuberculosis in the early stages is not recognized, and consequently the time of its inception is not generally known or reported. This, coupled with the fact that regular reports of the progress of many cases are lacking, renders it difficult to determine, with any degree of accuracy, the seasonal prevalence of the disease. Table 20 is therefore designed to take the place of a table showing the seasonal prevalence. The months of greatest fatality, named in the order of greatest numbers of deaths, were May, April, March and December; the months of least fatality being from June to September, inclusive.

TABLE 20.—*The seasonal fatality from tuberculosis in Michigan, as shown by the average numbers of deaths from this disease in each month in the eleven years, 1894-1904.*

Months.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of deaths.....	147	145	158	162	164	137	128	131	129	149	142	156

REPORTED SOURCES OF CONTAGIUM.

While dealing with but a small portion of the cases which occurred in 1904, Table 21 serves to indicate the manner in which tuberculosis is generally spread. Not including the eighty cases, said to have inherited the disease, 316 cases, or about 61 per cent of all the cases in which the source of contagium was stated, were reported as traced to personal contact or association with tuberculous persons, principally relatives. Though not definitely traced to their source, an additional 41 cases, or 8 per cent of the whole number, are believed to have originated in the same manner as the 316 cases. Members of a family in which there is a case of tuberculosis are necessarily and constantly exposed to the danger of infection unless the sputa are carefully and effectually disposed of. For this reason it should be the constant aim of physicians and health officials to educate the families of those suffering from the disease in the very simple methods for preventing its spread.

TABLE 21.—*Reported sources of contagium in tuberculosis in 1904.*

Reported sources	No. of instances.
From a previous case (by infection 182, by heredity 80).....	262
Association with tuberculous patients (principally relatives)	134
Probably from a previous case.....	41
From outside the State.....	27
From other jurisdictions in this State.....	24
Insanitary surroundings and poor living	13
Dust.....	7
Sporadic.....	3
Handling turpentine and paints.....	1
Cigarette smoking.....	1
Eating tuberculous food.....	1
Sleeping cars.....	1

PREDISPOSING INFLUENCES AND PREMONITORY SYMPTOMS.

Table 22 may well be studied in connection with Table 11 in the article on the subject of pneumonia, on a preceding page, the tables indicating that the principal predisposing influences are practically the same in tuberculosis as in pneumonia. Both tables emphasize the necessity for the "ounce of prevention" in prompt and thorough treatment of a cold or cough, or in an attack of influenza or bronchitis, and in restrictive and preventive measures in typhoid fever, measles and whooping-cough.

Five items in Table 21,—heredity, insanitary surroundings, dust, handling turpentine and paints, and cigarette smoking—reported as sources of contagium should properly be considered in connection with Table 22, because *per se* they are nothing more than predisposing influences.

TABLE 22.—*Predisposing influences and premonitory symptoms in tuberculosis, in the eight years, 1897-1904.*

Disease began with or followed:	Number of instances.	Disease began with or followed:	Number of instances.	Disease began with or followed:	Number of instances.
Cold or cough.....	3,905	Heart trouble.....	5	Chlorosis.....	1
Influenza (la grippe)	1,124	Serofula.....	4	Insomnia.....	1
Bronchitis.....	894	Gastritis.....	4	Womb trouble.....	1
Hemorrhage.....	583	Change of life.....	4	Dust on lungs.....	1
Pneumonia.....	582	Hay fever.....	4	Rupture of capillary.....	1
General debility.....	236	Pain in lungs.....	4	Complication of diseases.....	1
Pleurisy.....	75	Typhoid pneumonia.....	4	Pain in shoulder.....	1
Typhoid fever.....	63	Liver trouble.....	4	Pus infected hand.....	1
Catarrh.....	59	Marasmus.....	3	Tapeworm.....	1
Measles.....	53	Tubercular glands.....	3	Pelvic cellulitis.....	1
Asthma.....	36	Swelling in neck.....	3	Hardening of lungs.....	1
Diarrhea.....	34	Swelling of limbs.....	3	Catarrhal fever.....	1
Stomach or intestinal trouble.....	31	Headache.....	3	Softening of brain.....	1
Childbirth.....	30	Scarlet fever.....	3	Appendicitis.....	1
Malarial fever.....	28	Tonsillitis.....	3	Night sweats.....	1
Throat trouble.....	27	Paralysis.....	3	Cholera infantum.....	1
Abscess.....	26	Bladder trouble.....	3	Quinsy.....	1
Whooping-cough.....	23	Smallpox.....	2	Ulceration of rectum.....	1
Fever.....	20	Gangrene of lung.....	2	Brain fever.....	1
Overexertion.....	19	Pharyngitis.....	2	Severe burn on back.....	1
Bowel trouble.....	16	Profuse expectoration.....	2	Enlargement of spleen.....	1
Rheumatism.....	16	Lupus on face.....	2	Typho-malarial fever.....	1
Pain in the side.....	12	Extreme nervousness.....	2	Cancer.....	1
Glandular affection.....	12	Syphilis.....	2	Pain in breast.....	1
Inflammation or congestion of the lungs.....	10	Lumbago.....	2	Pott's disease.....	1
Kidney trouble.....	9	Curvature of spine.....	2	Diphtheria.....	1
Laryngitis.....	9	Tumor.....	2	Coughed up a pin which had been swallowed in childhood.....	1
Injury.....	9	Pain in abdomen.....	2	Cirrhosis of liver.....	1
Miscarriage.....	8	Diabetes.....	2	Sore mouth.....	1
Suppression of the menses.....	8	Amputation of legs.....	2	Result of vaccination.....	1
Anemia.....	7	Blood poisoning.....	1	Peritonitis.....	1
Lung fever.....	7	Dropsey.....	1	Pain in rectum.....	1
Sciatica.....	5	Ulceration of cornea.....	1	Puerperal fever.....	1
Fistula	5	Carbuncle on axillary gland...	1	Southern fever.....	1
				Spinal deformity.....	1

INFLUENCE OF OCCUPATION IN TUBERCULOSIS.

What has been said in the preceding article, relative to the influence of occupation in pneumonia, will apply equally to tuberculosis, as a comparison of Tables 14 and 23 will show.

TABLE 23.—*Occupations of tuberculous persons in the ten years, 1895-1904.*

Occupations.	Number of instances.	Occupations	Number of instances.	Occupations.	Number of instances.
Housework.....	5,089	Physician and surgeon.....	29	Veterinarian.....	3
Farmer.....	1,788	Butcher.....	28	Hair dresser.....	3
Laborer.....	1,378	Nurse.....	25	Butter maker.....	3
Student.....	699	Manufacturer.....	24	Civil engineer.....	3
Clerk.....	464	Musician.....	24	Showman.....	3
Merchant.....	199	Laundry work.....	23	Hunter.....	3
Mechanic.....	185	Pauper.....	21	Actor.....	3
Milliner or dressmaker.....	172	Moulder.....	20	Athlete.....	3
School teacher.....	157	Waiter.....	20	Florist.....	3
Carpenter.....	139	Soldier.....	18	Candy maker.....	2
Machinist.....	133	Minister.....	17	Stereotyper.....	2
Patient in asylum.....	120	Lawyer.....	17	Liveryman.....	2
Painter.....	91	Horse dealer.....	16	Reporter.....	2
Saloonkeeper or bartender.....	89	Fisherman.....	15	Tanner.....	2
Miner.....	88	Convict.....	15	Diver.....	2
Teamster.....	87	Photographer.....	15	Chiropodist.....	2
Salesman.....	83	Artist.....	13	Undertaker.....	2
Factory employe.....	77	Fireman.....	13	Paperhanger.....	2
Lumberman.....	68	Cooper.....	12	Patrolman.....	2
Railroad employe.....	68	Nun.....	12	Bricklayer.....	1
Barber.....	63	Peddler.....	10	Cutter.....	1
Printer.....	60	Marble cutter.....	10	Balloonist.....	1
Cigar maker.....	53	Mail carrier.....	9	Rag sorter.....	1
Engineer.....	51	Plasterer.....	7	Asylum attendant.....	1
Woodsman.....	41	Miller.....	7	Scientist.....	1
Look.....	38	Janitor.....	7	Dancing master.....	1
Sailor.....	36	Cattleman.....	6	Metal polisher.....	1
Mason.....	36	Milkman.....	6	Wood turner.....	1
Tailor.....	35	Journalist.....	5	Prostitute.....	1
Gardener.....	34	Boom man.....	5	Draughtsman.....	1
Baker.....	32	Builder and contractor.....	5	Feather renovator.....	1
Shoemaker.....	31	Dentist.....	4	Bootblack.....	1

CONSUMPTIVE RELATIVES OF CONSUMPTIVES.

Table 24 may serve to indicate, in some measure, the influence which a consumptive member of a family may exert upon other members of the same family, in respect to the spreading of the disease.

It will be noted that the numbers of male members were invariably less than the female members, of corresponding relation, thus: Sister, 1,045; brother, 688; mother, 778; father, 504; aunt, 275; uncle, 181;

daughter, 187, son, 89; wife, 120, husband, 105; and so on down the list. This may be accounted for by the fact that of all the cases reported to this Department, in which the sex was stated, 56 per cent were females and but 44 per cent males. In this connection attention is again directed to Table 23, in which it is shown that those engaged in housework (women) are more susceptible to tuberculosis than any other class of persons.

TABLE 24.—*Showing the relation between tuberculous persons and other tuberculous members of the same family, in Michigan, during the ten years, 1895-1904, arranged in order of the greatest number of times the relationship was mentioned in the reports from health officers.*

Relationship.	Number of times reported.	Relationship.	Number of times reported.
Sister.....	1,045	Half sister.....	8
Mother.....	778	Granddaughter.....	6
Brother.....	688	Entire family.....	6
Father.....	504	Stepdaughter.....	5
Aunt.....	275	Son-in-law.....	5
Daughter.....	187	Great grandmother.....	5
Uncle.....	181	Great aunt.....	5
Grandparent.....	138	Stepfather.....	4
Wife.....	120	Second cousin.....	4
Cousin.....	110	Daughter-in-law.....	3
Husband.....	105	Half brother.....	3
Son.....	89	Great uncle.....	2
Grandmother.....	56	Grandson.....	2
Niece.....	35	Children of a sister.....	2
Nephew.....	31	Stepmother.....	1
Grandfather.....	28	Father-in-law.....	1
Child.....	24	Great grandfather.....	1
Brother-in-law.....	13	Father's family.....	1
Sister-in-law.....	13	Mother's family.....	1
Mother-in-law.....	8		

INFLUENCE OF NATIONALITY IN TUBERCULOSIS.

Table 25 indicates that, of all those persons who suffered from tuberculosis in this State in the seven years, 1897-1903, about 61 per cent were native born and 39 per cent of foreign birth. Comparing these per cents with the ratio of native to foreign born residents of the State (about 78 per cent native born and 22 per cent foreign born), it will be seen that tuberculosis was most prevalent among those of foreign birth.

TABLE 25.—*Nationalities of tuberculous persons, in Michigan, in the seven years, 1897-1903.*

Nationalities—arranged in order of greatest number of cases.	Number of cases.	Nationalities—arranged in order of greatest number of cases.	Number of cases.
American.....	6,099	Nova Scotian.....	10
German.....	1,205	Russian.....	10
Canadian.....	599	Bohemian.....	10
Irish.....	502	Swiss.....	8
Dutch.....	324	Welsh.....	7
French.....	260	Prussian.....	5
Swedish.....	223	French-Indian.....	5
English.....	219	Assyrian.....	2
Finnish.....	135	Bavarian.....	2
Scotch.....	122	Mexican.....	2
Polish.....	101	French-German.....	2
Indian.....	74	Jewish.....	2
Norwegian.....	48	Greek.....	1
Negro.....	40	Hungarian.....	1
Danish.....	33	Australian.....	1
Austrian.....	24	Slavonic.....	1
Italian.....	24	French-Dutch.....	1
Caucasian.....	13	Armenian.....	1
Belgian.....	13	Roumanian.....	1
Scandinavian.....	12	English-Irish.....	1

INFLUENCE OF COLOR IN TUBERCULOSIS.

Table 26 indicates that, according to the proportion of white and colored persons in the population, tuberculosis was most prevalent among the colored population.

Of the colored population, the disease was most prevalent among the Indians.

TABLE 26.—*The color of tuberculous persons, in Michigan, reported during the ten years, 1895-1904.*

Color.	Number of instances in which the color was stated.	Per cent of all tuberculous persons of whom the color was stated.	Proportion of the total population of the State—Expressed in per cents.
White.....	16,730	96.87	99.08
Black (Negro).....	321	1.86	.64
Red (Indian).....	218	1.26	.26
Yellow (Japanese).....	1	.....	.....

INFLUENCE OF AGE AND SEX IN TUBERCULOSIS.

Table 27 indicates that the greater numbers of those of both sexes who died or recovered from tuberculosis were between the ages of 20 and 30 years. From infancy up to the age of 20 years there was a gradual increase, and from 30 to 80 years a gradual decrease in the numbers of those who died or recovered. Of those who died or recovered between the ages of 1 and 40 years, the greatest number were females, and from 40 to 80 years, the greatest number were males. At all ages the females constituted about 55 per cent of those who died.

TABLE 27.—*The influence of age and sex in tuberculosis, as indicated by the numbers of those who died or recovered from this disease in the eleven years, 1894-1904. Arranged, by sex, in age periods of ten years each.*

Age periods.	Died.									Recovered.								
	Numbers.			Per cent of all deaths of known ages,			Average deaths per year.			Numbers.			Average recoveries per year.					
	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,
Under 10 years.....	287	327	614	1.59	1.81	3.40	26	30	56	12	12	4	...	...	...	...	...	...
10 to 20 years.....	674	1,516	2,190	3.74	8.40	12.14	61	138	199	3	11	19	...	...	...	...	...	...
20 to 30 years.....	2,315	3,301	5,616	12.84	18.30	31.14	210	300	510	14	19	33	...	...	...	...	...	...
30 to 40 years.....	1,647	2,134	3,781	9.13	11.83	20.96	150	194	344	12	17	29	...	...	...	...	...	...
40 to 50 years.....	1,228	1,133	2,361	6.81	6.28	13.09	112	103	215	8	6	14	...	...	...	...	...	...
50 to 60 years.....	892	707	1,599	4.95	3.92	8.87	81	64	145	4	1	5	...	...	...	...	...	...
60 to 70 years.....	621	557	1,178	3.44	3.09	6.53	56	51	107	3	1	4	...	...	...	...	...	...
70 to 80 years.....	336	272	608	1.86	1.51	3.37	31	25	56	0	1	1	...	...	...	...	...	...
80 and over.....	43	46	89	.24	.26	.50	4	4	8	0	0	0	...	...	...	...	...	...
All ages.....	8,043	9,993	18,036	44.59	55.41	100.00	731	909	1,640	51	58	109	5	5	10	...	...	...

CIVIL CONDITION OF TUBERCULOUS PERSONS.

During the years 1895-1904, the reports indicate that of those who suffered from tuberculosis, about 60 per cent were or had been married, and 40 per cent were single.

LOCATION OF THE DISEASE IN TUBERCULOSIS.

Table 28 shows that for a period of ten years, ending in 1904, the disease was located in the lungs in nearly five times as many instances as in all the other organs of the body combined. Usually the disease was located in more than one part of the body, in many instances in three different organs or parts at the same time.

TABLE 28.—*Location of the disease in tuberculous patients, in Michigan, during the ten years, 1895-1904.*

Part of the body.	Number of instances.	Part of the body.	Number of instances.
Abdomen.....	40	Maxilla.....	1
Alimentary canal.....	4	Membranes.....	1
Ankle.....	2	Meninges.....	7
Arm.....	2	Mesentery.....	26
Back.....	5	Miliary.....	68
Bladder.....	16	Muscles.....	1
Blood.....	5	Neck.....	11
Bones.....	6	Omentum.....	1
Bowels.....	568	Ovaries.....	2
Brain.....	31	Pelvis.....	4
Breast.....	2	Peritoneum.....	99
Bronchi.....	98	Pharynx.....	5
Chest.....	100	Pleura.....	8
Elbow.....	2	Rectum.....	11
Face.....	2	Respiratory organs.....	4
Fibroid.....	33	Ribs.....	2
Foot.....	5	Shoulder.....	2
General.....	312	Side.....	12
Glands.....	36	Skin.....	2
Hand.....	1	Spine.....	28
Head.....	12	Spleen.....	6
Heart.....	14	Stomach.....	157
Hip joint.....	43	Suprarenal capsules.....	1
Iliac.....	2	Testicle.....	2
Inguinal.....	1	Thigh.....	3
Intestines.....	121	Thorax.....	27
Joints.....	6	Throat.....	279
Kidneys.....	57	Tissues.....	2
Knee.....	13	Tongue.....	2
Larynx.....	134	Uterus.....	1
Leg.....	5	Vertebrae.....	1
Liver.....	54	Viscera.....	3
Lungs.....	12,128	Windpipe.....	6
Lymph system.....	11	Womb.....	2
Mastoid.....	1		

DURATION OF SICKNESS IN TUBERCULOSIS.

In using Table 29 it should be borne in mind that, in a large number of instances, the beginning of the disease was not definitely known, the duration periods given usually representing the time which elapsed between the recognition of the disease in an advanced stage and the death or recovery of the patient. This may be seen by the large numbers of cases of those who died or recovered at some time within one year of the reported time of commencement of the sickness.

TABLE 29.—*The duration of sickness in fatal and non-fatal cases of tuberculosis, in Michigan, during the eleven years, 1894-1904.*

Duration periods.	Fatal cases.						Non-fatal cases.		
	Numbers.			Per cent of all cases of known duration.			Numbers.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 month.....	296	272	568	2.5	2.3	4.9	3	2	5
2 months.....	253	331	584	2.2	2.8	5.0	8	5	13
3 months.....	274	421	695	2.4	3.6	6.0	5	9	14
4 months.....	282	364	646	2.4	3.1	5.6	6	1	7
5 months.....	237	336	573	2.0	2.9	4.9	4	3	7
6 months.....	390	464	854	3.4	4.0	7.3	4	2	6
7 months.....	189	297	486	1.6	2.6	4.2	2	3	5
8 months.....	204	316	520	1.8	2.7	4.5	4	5	9
9 months.....	165	286	451	1.4	2.5	3.9	1	4	5
10 months.....	138	175	313	1.2	1.5	2.7	1	1	2
11 months.....	113	180	293	1.0	1.5	2.5	3	1	4
Under 1 year	2,541	3,442	5,933	21.9	29.6	51.5	41	36	77
1 to 2 years.....	1,154	1,540	2,694	9.9	13.2	23.2	10	14	24
2 to 3 years.....	625	761	1,386	5.4	6.5	11.9	3	5	8
3 to 4 years.....	286	347	633	2.5	3.0	5.4	2	3	5
4 to 5 years.....	127	141	268	1.1	1.2	2.3	2	1	3
5 years and over.....	313	346	659	2.7	3.0	5.7	0	4	4
Totals	5,046	6,577	11,623				58	63	121

BACTERIOLOGICAL DIAGNOSIS IN TUBERCULOSIS.

During the ten years, 1895-1904, reports relative to the bacteriological examination of 1,637 samples of sputa of suspected cases of tuberculosis indicate that 93 per cent gave positive and 7 per cent negative results.

RESTRICTIVE AND PREVENTIVE MEASURES.

That the education of the people in matters pertaining to the restriction of tuberculosis has not produced the results which, considering the wide publicity given the subject, might have been anticipated, is indicated by Table 30. The destruction of the sputa—upon which the restriction of tuberculosis principally depends—was properly carried out in but a little more than one-third of all the cases which occurred in 1904. It is not easy to place the blame for this condition, because it is believed that the members of the medical profession and the laity are both alive to the great importance of such restrictive measures, and well informed as to the simple methods of accomplishing the destruction of the infective material.

In many cases the disease is not recognized, or the services of a physician called and restrictive measures begun until the patient is in the advanced stages of the disease.

For the better restriction of tuberculosis three lines of work, of paramount importance, and previously outlined in many publications of this Board, are here reiterated:

1. A careful study of the early symptoms of the disease so that incipient cases may be more easily and more frequently recognized than at the present time.

2. Careful tuition of the patient in the best measures for preventing the spread of the disease to others, and for securing himself or herself against re-infection.

3. Painstaking and conscientious effort on the part of the patient to prevent himself or herself from becoming a center of infection.

The burden of this work must, of necessity, devolve upon the medical practitioners, and it is to them we must look mainly for any material reduction in the sickness and deaths from this disease.

To the patient, the duty of taking care of and destroying the sputa; the turning away of the face and covering of the mouth and nostrils during a fit of coughing when in close proximity to others; the disinfection of all discharges from the body; and the thorough disinfection of all drinking vessels and other articles which may come in contact with the patient's mouth, and which may be used by others as well as the patient, may seem irksome, and to some unnecessary or unimportant. Nevertheless, until this daily and hourly task shall have become an integral part of every patient's daily life, we cannot hope for a successful termination of the warfare now being waged against this disease.

A person who, while suffering from tuberculosis, carelessly or wilfully expectorates promiscuously and refuses to take precautionary measures, should be placed in detention until willing to comply with the simple and reasonable requirements laid down for his guidance.

TABLE 30.—*Showing the number and per cent of cases of tuberculosis in which the sputa, articles liable to be soiled by sputa, discharges from the bowels and bladder, and rooms occupied by tuberculous persons, were reported as having been properly disinfected, during the year 1904.*

Disinfection of:	Number of instances in which the disinfection was reported as thorough.	The per cent of all cases of tuberculosis in which the disinfection was said to be thorough.
Sputa.....	1,101	38
Articles liable to be soiled by sputa.....	1,069	37
Discharges from the bowels and bladder.....	486	17
Rooms occupied by patients.....	1,252	44

MENINGITIS IN MICHIGAN IN 1904 AND PRECEDING YEARS.

During the year 1904, meningitis was reported to the Secretary of the State Board of Health from 279 localities, in which there were reported to have occurred 598 cases, including 586 deaths from this disease. Of the 598 cases, 27 were reported as having recovered, three as having moved out of the State, and one as being still sick at the close of the year.

From the numbers of cases and deaths shown in Table 31, it will be seen that, as a rule, only the fatal cases were reported.

In previous years the disease has been considered under the various names reported, viz.: Cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis, and traumatic meningitis. In this article, all the various forms of the disease have been considered under the general title of meningitis.

For the purpose of learning what relation the numbers of cases and deaths from tubercular and traumatic meningitis bear to the total meningitis, these two forms of the disease have been considered separately in Table 32.

In the tables, wherever possible, totals, averages and per cents for a series of years, rather than for the single year 1904, have been shown.

By Table 31 it will be seen that in 1899, when the statistical study of meningitis was first commenced by this Department, the disease was unusually prevalent, therefore the averages of series of years beginning with 1899 are higher than they would be for similar periods under normal conditions.

THE GENERAL PREVALENCE OF MENINGITIS.

By Table 31 it will be seen that, excluding the figures for the epidemic year 1899, about 600 persons, or about 25 per 100,000 of the population, die annually from all forms of meningitis in this State.

TABLE 31.—*The prevalence of meningitis in Michigan in each of the six years, 1899-1904.*

Years.	Population.	Number of cases.*	Number of deaths.	Deaths per 100,000 population.
1899.....	2,426,331†	1,306	1,079	44.5
1900.....	2,420,982	747	688	28.4
1901.....	2,448,241†	614	594	24.3
1902.....	2,475,499†	632	598	24.2
1903.....	2,502,758†	645	630	25.2
1904.....	2,530,016	598	586	23.2
Annual averages, 1899-1904.....	2,467,305	757	696	28.2

*From many localities, only the fatal cases were reported, so that the figures in this column do not represent the number of cases which actually occurred.

†Estimated.

TABLE 32.—*The reported numbers of cases and deaths from tubercular and traumatic meningitis in the six years, 1899-1904.*

Years.	Tubercular.				Traumatic.			
	Number of cases.	Number of deaths.	Per cent of all forms of meningitis.		Number of cases.	Number of deaths.	Per cent of all forms of meningitis.	
			Cases.	Deaths.			Cases.	Deaths.
1899.....	42	41	3	4	22	22	2	2
1900.....	93	83	12	12	17	17	2	2
1901.....	86	86	14	14	22	22	4	4
1902.....	96	94	15	16	8	8	1	1
1903.....	106	106	16	17	14	14	2	2
1904.....	126	* 133	21	23	24	24	4	4
Averages per year.....	92	91	14	14	18	18	3	3

*Many cases began in 1903, and some in previous years.

Table 33 does not include tubercular meningitis, and does not, therefore, accurately represent the prevalence of meningitis in the State. It will be useful, however, in the study of the fluctuations of the disease during the 30 years.

TABLE 33.—*The number of reported deaths from meningitis* per 100,000 persons living in Michigan in each of the 30 years, 1869-1898, compiled from reports to the Secretary of State.*

Year.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Deaths.....	1.2	.9	2.0	28.6	62.6	13.9	12.0	8.6	9.3	7.2	6.6	9.7
Year.....	1881.	1882.	1883	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Deaths.....	19.6	13.0	12.7	12.8	9.2	9.4	9.3	9.6	8.0	8.6	9.6	6.8
Year.....	1893.	1894.	1895.	1896.	1897.	†1898.						
Deaths.....	7.8	8.1	7.8	8.3	9.7	28.4						

*Does not include tubercular meningitis.

†Not all the deaths were reported under the old law, therefore a comparison of death rates for any year subsequent to 1897 with the death rates for any period prior to 1898 would not be reliable. The rates for the 29 years, ending with 1897, probably quite accurately represent the annual fluctuations of the disease.

GEOGRAPHICAL DISTRIBUTION OF MENINGITIS.

Table 34 indicates that during the six years, ending with 1904, meningitis was more prevalent than the average for the State as a whole (shown in Table 31) in the Upper Peninsular, Northwestern, Northern, Western, Northern Central, and Southeastern Divisions.

By the same standard, the disease was much more prevalent than the average in the counties of Baraga, Houghton, Keweenaw, Marquette, Menominee, Benzie, Manistee, Wexford, Antrim, Cheboygan, Emmet, Kent, Mecosta, and Wayne.

TABLE 34.—*The geographical distribution of meningitis in the six years, 1899-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living in each geographical division.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death
				rates.
UPPER PENINSULAR DIVISION.	263,988	130	115	43.6
Alger county.....	6,066	3	2	33.0
Baraga county.....	4,881	3	3	61.5
Chippewa county.....	21,352	4	4	18.7
Delta county.....	25,244	8	7	27.7
Dickinson county.....	17,950	6	6	33.4
Gogebic county.....	16,720	5	4	23.9
Houghton county.....	66,147	61	52	78.6
Iron county.....	8,957	† 1	† 1	11.2
Keweenaw county.....	3,056	2	2	54.7
Luce county.....	3,230	1	1	31.0
Mackinac county.....	7,729	2	2	25.9
Marquette county.....	40,590	18	17	41.9
Menominee county.....	26,504	11	10	37.7
Ontonagon county.....	6,619	3	2	30.2
Schoolcraft county.....	8,343	2	2	24.0
NORTHWESTERN DIVISION.	88,868	44	32	36.0
Benzie county.....	10,464	7	4	38.2
Grand Traverse county.....	21,986	6	5	22.7
Leelanau county.....	10,800	3	3	27.8
Manistee county.....	27,674	15	10	36.1
Wexford county.....	17,944	13	10	55.7
NORTHERN DIVISION.	80,170	29.3	26.2	32.7
Antrim county.....	15,917	8	7	44.0
Charlevoix county.....	14,720	2	2	13.6
Cheboygan county.....	16,371	8	7	42.8
Crawford county.....	3,221	.3	.2	6.2
Emmet county.....	16,262	7	6	36.9
Kalkaska county.....	7,182	2	2	27.8
Otsego county.....	6,497	2	2	30.8
NORTHEASTERN DIVISION.	57,522	10.7	9.7	16.9
Alcona county.....	5,644	.7	.7	12.4
Alpena county.....	19,232	3	3	15.6
Iosco county.....	10,117	3	2	19.8
Montgomery county.....	3,417	1	1	29.3
Ogemaw county.....	7,987	1	1	12.5
Oscoda county.....	1,679	0	0	0.0
Presque Isle county.....	9,446	2	2	21.2
WESTERN DIVISION.	272,397	91	81	29.7
Kent county.....	134,577	58	49	36.4
Lake county.....	5,005	1	1	20.0
Mason county.....	19,534	4	4	20.5
Muskegon county.....	36,664	9	9	24.5
Newaygo county.....	17,945	4	4	22.3
Oceana county.....	17,271	3	3	17.4
Ottawa county.....	41,401	12	11	26.6
NORTHERN CENTRAL DIVISION.	104,951	33.5	32.2	30.7
Clare county.....	8,729	3	3	34.4
Gladwin county.....	7,280	1	1	13.7
Isabella county.....	23,664	9	8	33.8
Mecosta county.....	20,715	8	8	38.6
Midland county.....	14,851	4	4	26.9
Muskegon county.....	9,713	3	3	30.9
Oscoda county.....	18,335	5	5	27.3
Roscommon county.....	1,604	.5	.2	12.0

*This footnote is below Table 16 on a preceding page.

†Average for five years only.

TABLE 34.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	345,172	83	79	22.9
Arenac county.....	9,755	1	1	10.3
Bay county.....	63,664	18	13	28.3
Huron county.....	34,944	8	7	20.0
Lapeer county.....	27,532	5	4	14.5
Saginaw county.....	83,091	19	19	22.9
Sanilac county.....	35,074	8	7	20.0
St. Clair county.....	55,042	14	14	25.4
Tuscola county.....	36,070	10	9	25.0
CENTRAL DIVISION.	315,128	80	72	22.8
Barry county.....	22,490	8	6	26.7
Clinton county.....	25,302	6	5	19.8
Eaton county.....	31,535	7	7	22.2
Genesee county.....	42,225	9	9	21.3
Gratiot county.....	29,996	10	9	30.0
Ingham county.....	41,797	10	9	21.5
Ionia county.....	34,956	10	8	22.9
Livingston county.....	19,282	3	3	15.6
Montcalm county.....	33,516	10	9	26.9
Shiawassee county.....	34,029	7	7	20.6
SOUTHWESTERN DIVISION.	142,894	30	28	19.6
Allegan county.....	38,979	11	10	25.7
Berrien county.....	49,577	9	9	18.2
Cass county.....	20,620	3	3	14.5
Van Buren county.....	33,718	7	6	17.8
SOUTHERN CENTRAL DIVISION.	322,016	72	68	21.1
Branch county.....	26,833	6	6	22.4
Calhoun county.....	51,355	10	10	19.5
Hillsdale county.....	29,840	6	5	16.8
Jackson county.....	47,796	12	12	25.1
Kalamazoo county.....	46,786	12	11	23.5
Lenawee county.....	48,736	9	9	18.5
St. Joseph county.....	23,758	6	5	21.0
Washtenaw county.....	46,912	11	10	21.3
SOUTHEASTERN DIVISION.	473,981	158	157	33.1
Macomb county.....	33,159	9	9	27.1
Monroe county.....	33,071	9	10	30.2
Oakland county.....	45,135	6	6	13.3
Wayne county.....	362,616	134	132	36.4

*This footnote is below Table 16, on a preceding page.

†Average for five years only.

THE PREVALENCE OF MENINGITIS IN URBAN AND RURAL LOCALITIES.

Table 35 shows meningitis to have been present in 1904 in 22 per cent of the incorporated cities and villages and in 15 per cent of the townships in this State.

As in the case of pneumonia and tuberculosis, previously considered, meningitis was most prevalent in the large centers of population, and, with the exception of the group of cities and villages of from 5,000 to 10,000 population, decreased as the population decreased.

As indicated by the death rates, the cities and villages in which meningitis was much more prevalent than the average for the State (23.2 deaths per 100,000) were: Ishpeming (with a death rate of 86 per

100,000). Hancock (82.8), Cheboygan (74.3), Monroe (65.3), Coldwater (64.3), Petoskey (57.8), Adrian (46.8), Traverse City (44.5), Detroit (41.2), Kalamazoo (40.3), Woodmere (39.7), Grand Haven (38.2), Escanaba (36.0), Menominee (36.0), Grand Rapids (34.5), Bay City (32.6), Delray (30.2), and Port Huron (30.0).

TABLE 35.—*The prevalence of meningitis in urban and rural localities in Michigan, in 1904.*

Localities—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.	Deaths.	Death rates per 100,000 of the population
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	158	164	39.7
Cities from 25,000 to 50,000.....	129,336	4	4	100	36	35	27.1
Cities from 10,000 to 25,000, and Calumet township, (17,150).....	266,888	19	15	79	72	72	27.0
Cities and villages from 5,000 to 10,000.....	139,870	21	18	86	38	39	27.9
Cities and villages under 5,000.....	397,332	367	53	14	81	67	16.9
Total urban.....	1,346,735	413	92	22	385	377	28.0
Rural (townships*).....	1,183,281	1,217	187	15	213	209	17.7

*Not including Calumet, which, for the purpose of this study, is classed with urban localities having corresponding populations.

THE SEASONAL PREVALENCE OF MENINGITIS.

Table 36 is compiled from two different sources, and shows that meningitis is most prevalent in the months of March, April, May and July, and least prevalent in the months of October, November and December. This coincides with the results of observations made in epidemics of meningitis in this and other countries, notably the outbreak in New York in 1892 and 1893, which was the most violent in May; the epidemic in Cologne in 1895, which reached its maximum in April; and the epidemic in Strasburg in 1841, in which the greatest numbers of cases occurred in March.

TABLE 36.—*The seasonal prevalence of meningitis in Michigan, in so far as indicated by the average numbers of cases taken sick, and the average numbers of deaths reported to the Secretary of State, from this disease, in each month, in the six years, 1899-1904.*

Months.....	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of those taken sick	38	39	72	67	57	37	41	40	39	33	28	28
Average numbers of deaths.....	41	43	63	67	63	43	46	41	38	33	27	31

TABLE 37.—*Reported sources of contagium and predisposing influences in meningitis, 1899-1904.*

Source of contagium or predisposing influence.	Number of instances.	Source of contagium or predisposing influence.	Number of instances.
Injury.....	107	Spasms.....	3
Cold.....	79	Erysipelas.....	3
Influenza.....	65	Septicemia.....	3
From a former case.....	52	Idiocy.....	3
Pneumonia.....	44	Mal-nutrition from birth.....	3
Exposure to inclement weather.....	35	Result of operation.....	3
Middle ear disease.....	32	Hydrocephalus.....	3
Tuberculosis.....	28	Congenital.....	3
Measles.....	28	Diseases of the eye.....	2
Whooping-cough.....	25	Septic poisoning.....	2
Cholera infantum.....	22	Rachitis.....	2
Related to or associated with consumptives.....	22	Exposure to sun.....	2
Bowel or stomach trouble.....	19	Cigarette smoking.....	2
Insanitary conditions	17	Idiopathie.....	2
Overwork.....	14	Enterocolitis.....	2
Intestinal trouble.....	13	Overwork and exposure.....	2
Typhoid fever and complications.....	11	Pneumonia and measles.....	2
Bronchitis.....	10	Teething and cold.....	2
Teething.....	10	Bright's disease.....	2
Syphilis.....	9	Paralysis.....	2
Dysentery.....	9	Overheat.....	2
Scarlet fever.....	9	Cancer.....	2
Inherited.....	9	Ulcerated tooth.....	2
Diarrhea.....	9	Childbirth.....	2
Alcoholism.....	8	Despondency.....	2
General debility.....	7	Direct exposure to meningitis.....	2
Abscess.....	7	Dementia.....	2
Malaria.....	5	Mental strain.....	1
Rheumatism.....	5	Cold following bronchitis.....	1
Spinal affection.....	5	Drinking much ice water.....	1
Indigestion.....	5	Abscess and bronchitis.....	1
Glandular affection.....	4	Influenza and acute otitis media.....	1
Spina bifida.....	4	From outside the State.....	1
Epilepsy.....	3	Intemperance and bursting of blood vessel.....	1
Tumor.....	3	Dentition	1
Enteritis.....	3	Lack of bone formation at base of brain	1

TABLE 37.—CONCLUDED.

Source of contagium or predisposing influence.	Number of instances.	Source of contagium or predisposing influence.	Number of instances.
Ruptured blood vessel.....	1	Syphilis and tumor of brain.....	1
Worms.....	1	Rheumatic fever.....	1
Inhalation of sewer gases.....	1	Brain tumor.....	1
Concussion.....	1	Burn or scald.....	1
Puerperal infection.....	1	Severe nervous shock from whipping at school.....	1
Peritonitis.....	1	Goutre.....	1
Abortion.....	1	Feet presentation.....	1
Pleurisy.....	1	Myelitis in father.....	1
Dropsy of brain.....	1	Spina bifida and hydrocephalus.....	1
Female trouble.....	1	Neurotic.....	1
Brain disease.....	1	Sporadic.....	1
Diphtheria.....	1	Smallpox.....	1
Remitter fever.....	1	Mumps.....	1
Continued fever.....	1	Purulent ophthalmia.....	1
Headache.....	1	Venereal infection.....	1
Old age.....	1	Hemorrhage.....	1
Gastro-enteritis and pneumonia.....	1	Extraction of teeth.....	1
Carbuncle.....	1	Miscarriage.....	1
Blood poison.....	1	Non-development of skull.....	1
Sun stroke.....	1	Outside jurisdiction.....	1
Nasal trouble.....	1	Tonsillitis.....	1
Gastro-intestinal.....	1	Scrofula.....	1
Insanitary conditions and syphilis	1	Appendicitis.....	1
Feeble from birth.....	1	Locomotor ataxia.....	1
Chronic St. Vitus dance and acute eclampsia.....	1	Infected article.....	1
De Novo.....	1	Measles and strichnine poisoning.....	1
Well water.....	1	Pernicious anemia and cold.....	1
Auto-infection from obstruction of bowels.....	1	Exposure to dampness and cold during pregnancy.....	1
Large brain	1	Operation for pressure on the brain.....	1

REPORTED SOURCES OF CONTAGIUM AND PREDISPOSING INFLUENCES IN
MENINGITIS.

The number of instances in which the source of the contagium or the predisposing influences in meningitis were reported to this Department during the six years, ending in 1904, was but slightly more than one-fifth of the total number of cases which occurred during that period. It is believed, however, that the summary of these reports, shown in Table 37, is fairly representative of the diseases and influences usually associated with and which play an important part in outbreaks of meningitis.

Table 38 may well be studied in connection with Table 37, and when continued for a number of years Table 38 will probably be of much value in determining the connection between outbreaks of meningitis and of the other three diseases named in the table.

TABLE 38.—*Meningitis in 1904, and previous and contemporaneous cases of meningitis, tuberculosis, influenza and pneumonia, which occurred in the same families in which the meningitis patients resided.*

Diseases.	The time which elapsed between cases of meningitis in 1904 and previous and contemporaneous cases of the diseases named below, with the numbers of instances in each period of time.											
	At or about the same time.	21 days.	One month.	Three months.	Four months.	Five months.	Six months.	One year.	One and one-half years.	Two and one-half years.	Five years.	No time stated.
Meningitis.....	1	.....	.....	1	.....	1	.....	1	.....	1	.....	2
Tuberculosis.....	3	.....	1	.....	.....	1	.....	1	.....	1	.....	7
Influenza.....	4	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Pneumonia.....	1	.....	.....	1	.....	1	.....	1	.....	1	.....	.....

TABLE 39.—*The influence of age and sex in meningitis, in Michigan, as indicated by the numbers of those who died from this disease in the six years, 1899-1904. Arranged, by sex, in age periods of five years each.*

Age periods.	Numbers of deaths in which the age was stated.				Per cent of all deaths from meningitis of known ages.				Average deaths per year.			
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 5 years.....	1,314	967	2,281	32.2	23.7	55.9	219	161	380	.....	.....	.....
5 to 9 years.....	237	224	461	5.8	5.5	11.3	40	37	77	.....	.....	.....
10 to 14 years.....	120	135	255	2.9	3.3	6.2	20	23	43	.....	.....	.....
15 to 19 years.....	149	122	271	3.6	3.0	6.6	25	20	45	.....	.....	.....
20 to 24 years.....	90	78	168	2.2	1.9	4.1	15	13	28	.....	.....	.....
25 to 29 years.....	69	53	122	1.7	1.3	3.0	12	9	21	.....	.....	.....
30 to 34 years.....	48	44	92	1.2	1.1	2.3	8	7	15	.....	.....	.....
35 to 39 years.....	57	36	93	1.4	.9	2.3	10	6	16	.....	.....	.....
40 to 44 years.....	43	35	78	1.1	.9	1.9	7	6	13	.....	.....	.....
45 to 49 years.....	34	28	62	.8	.7	1.5	6	5	11	.....	.....	.....
50 years and over.....	120	81	201	2.9	2.0	4.9	20	14	34	.....	.....	.....
All ages.....	2,281	1,803	4,084	55.9	44.1	100.00	380	301	681	.....	.....	.....

THE INFLUENCE OF AGE AND SEX IN MENINGITIS.

Table 39 confirms what has been stated in preceding reports relative to meningitis, that it is essentially a disease of childhood, nearly 56 per cent of all the fatal cases, in which the age was stated, during the six years ending in 1904, having occurred in children under 5 years of age. With but one or two slight exceptions, there was a gradual decrease in the number of deaths corresponding with each increase in the ages.

With but one exception (ages 10 to 14 years), meningitis was most fatal amongst the male population at all ages shown in the table.

THE DURATION OF SICKNESS IN MENINGITIS.

Table 40 shows that of 1,721 fatal cases of meningitis in the four years, 1901-1904, 35 per cent of the deaths occurred between the first and fifth days; about 61 per cent between the first and tenth days; and upwards of 77 per cent between the first and fifteenth days.

TABLE 40.—*The duration of sickness in fatal cases of meningitis, in the four years, 1901-1904. Arranged, by sex, in five day periods.*

Duration periods.	Numbers of deaths in which the duration was stated			Averages per year.			Per cent of all fatal cases of meningitis of known duration.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 to 5 days.....	353	248	606	90	62	152	20.8	14.4	35.2
6 to 10 days.....	223	219	442	56	55	111	13.0	12.7	25.7
11 to 15 days.....	133	142	280	35	36	70	8.0	8.3	16.3
16 to 20 days.....	61	58	119	15	15	30	3.5	3.4	6.9
21 to 25 days.....	48	36	84	12	9	21	2.8	2.1	4.9
26 to 30 days.....	24	14	38	6	4	10	1.4	.8	2.2
31 to 35 days.....	10	15	25	3	4	6	.6	.9	1.5
36 to 40 days.....	7	9	16	2	2	4	.4	.5	.9
41 to 45 days.....	8	4	12	2	1	3	.5	.2	.7
46 to 50 days.....	4	7	11	1	2	3	.2	.4	.6
51 days and over.....	45	43	88	11	11	22	2.6	2.5	5.1
Totals and averages.....	926	795	1,721	232	199	430	53.8	46.2	100.00

RESTRICTIVE MEASURES IN MENINGITIS.

Information from health officers relative to restrictive measures in meningitis in 1904 was very meagre, as may be seen by reference to Table 41. So far as indicated by those reports in which definite statements relative to isolation and disinfection were made, in but a small proportion of the cases were the usual precautions taken to prevent the spread of the disease.

The attention of health officers, and physicians generally throughout the State, is directed to the statements made relative to the disposal of the bowel discharges in this and other diseases in the spread of which diseases the bowel discharges are believed to play an important part. Burying the discharges, or the throwing of them into a privy vault, cesspool, or sewer, *without previous disinfection*, is not a proper disposal of such discharges, and yet a large number of the reports indicate that this is the usual method.

TABLE 41.—*Relative to restrictive measures in meningitis in 1904.*

Restrictive measures.	Number of instances.	Per cent of all cases.
ISOLATION: Enforced.....	70	12
Neglected.....	218	.....
Not stated, or statements doubtful.....	310	.....
SPUTA: Disinfected.....	116	21*
Not disinfected.....	96	.....
No statement relative to disposal of, or statements doubtful	336	.....
ARTICLES LIABLE TO BE SOILED BY SPUTA:		
Disinfected.....	156	28*
Not disinfected.....	110	.....
Not stated, or statements doubtful.....	282	.....
BOWEL DISCHARGES: Disinfected.....	85	14†
Buried.....	36	.....
Thrown in vault.....	33	.....
Thrown in sewer.....	31	.....
"Thrown out".	9	.....
"Usual" disposition.....	5	.....
Disposition not mentioned or statements doubtful.....	388	.....
INFECTED ROOMS: Disinfected.....	234	39
Not disinfected.....	104	.....
Disinfection attempted but not sufficient.....	40	.....
Disinfection doubtful.....	54	.....
Not stated.....	166	.....

*Fifty cases in which there was said to be no sputa excluded in making these per cents.

†Four cases in which there was said to be no discharges excluded in making this per cent.

**TYPHOID FEVER (INCLUDING TYPHOID PNEUMONIA AND
TYPHO-MALARIAL FEVER) IN MICHIGAN IN 1904 AND
PRECEDING YEARS.**

GENERAL PREVALENCE.

During the year ending December 31, 1904, there were reported to the State Department of Health 910 outbreaks of typhoid fever, in 675 localities, in which there were 3,028 cases, including 731 deaths.

Compared with 1903, the disease was present in 1904 at 27 localities less, and the number of outbreaks was 19 less, but the numbers of cases and deaths were more, and also more than in the three preceding years, as may be seen by reference to Table 42.

Compared with the average for the preceding twenty years, there was an increase of 337 cases and 207 deaths in 1904.

From Detroit, Bay City, Menominee, and Marine City, and probably many other localities, only the fatal cases were reported, so that the total number of cases was much in excess of those reported. Upon the basis of 7 deaths per 100 cases—the usual death rate from typhoid fever in hospitals—in Detroit there would have occurred about 929 cases, in Bay City 186 cases, in Menominee 214 cases, and in Marine City 71 cases, a total for the four cities of 1,304 cases more, and for the entire State of 7,415 cases more, than were actually reported.

Table 42 shows an average death rate for 21 years of 19 per cent, and for the period of 7 years, 1898-1904, under the new law for reporting deaths, an average of 22 per cent. The wide difference between these rates and those in hospitals is a striking commentary of the fact that a large number of cases of typhoid fever are not reported by the attending physicians. Still further evidence of this fact may be obtained from Table 1, on a preceding page of this article, where it is shown that for the year 1904 first information relative to 19 per cent of the outbreaks of typhoid fever was obtained from the death returns to the Secretary of State, and about 4 per cent from newspapers.

As indicated by the death rates per 100,000 of the population, shown in Table 42, typhoid fever was much more prevalent in 1904 than the average for the preceding twenty years. As many deaths were not reported under the old law in each year prior to 1898, a comparison of 1904 with the average for the years 1898-1903 (28 deaths per 100,000) will be more accurate, and indicates that typhoid fever was slightly more prevalent in 1904 than in the average year.

Table 43 is inserted to enable those wishing to do so to make a study of the prevalence of typhoid fever in the years prior to those shown in Table 42.

TABLE 42.—*The general prevalence of typhoid fever in Michigan in the twenty-one years, 1884-1904. Compiled from reports to the State Department of Health.**

Years.	Population, (Estimated for intercensal years.)	Reported cases.†	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	969	290	27	15.6
1885.....	1,893,697	715	194	23	10.2
1886.....	1,933,735	1,194	282	18	14.6
1887.....	1,973,774	3,424	411	17	20.8
1888.....	2,013,812	1,511	310	21	15.4
1889.....	2,053,851	2,530	* 681	27	33.2
1890.....	2,093,889	1,924	304	16	14.5
1891.....	2,130,827	4,670	697	15	32.7
1892.....	2,167,765	2,591	538	21	24.8
1893.....	2,204,703	3,512	594	17	26.9
1894.....	2,241,641	2,805	506	18	22.6
1895.....	2,271,531	3,751	621	17	27.3
1896.....	2,301,421	2,506	409	16	17.8
1897.....	2,331,311	1,900	352	19	15.1
1898.....	2,361,201	2,874	634	24	26.9
1899.....	2,391,091	3,194	638	20	26.7
1900.....	2,420,982	5,122	920	18	38.0
1901.....	2,450,872	3,002	665	22	27.1
1902.....	2,475,499	2,456	596	24	24.1
1903.....	2,502,758	2,840	640	23	28.9
1904.....	2,530,016	3,028	731	24	29.7
Averages per year	2,218,954	2,691	524	19	23.6

*In an outbreak of typhoid fever at Negaunee in 1889, 300 cases but no deaths were reported, therefore the deaths from typhoid fever for that year reported to the Secretary of State have been used in place of the deaths reported to the State Department of Health.

†From many localities only the fatal cases were reported, so that the total number of cases for each year was much in excess of those given in this column.

TABLE 43.—*The numbers of deaths from typhoid fever* per 100,000 persons living, in Michigan, in each of the 15 years 1869-1883. Compiled from reports to the Secretary of State.*

Years.....	1869	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	39.0	48.5	29.2	49.4	52.8	45.8	31.3	30.1	30.3	22.6	25.5
Years.....	1880.	1881.	1882.	1883.							
Deaths.....	31.9	55.2	28.4	25.0							

*Includes typho-malarial fever, but not typhoid pneumonia.

TABLE 44.—*The geographical distribution of typhoid fever in the fourteen years, 1891-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.				
Alger county.....	234,354	643	85	36.3
Barron county.....	4,298	3	.4	9.3
Chippewa county.....	4,558	29	3	65.8
Delta county.....	18,110	60	8	44.2
Dickinson county.....	22,078	47	10	45.3
Gogebic county.....	16,475	39	5	30.3
Houghton county.....	15,583	97	8	51.3
Iron county.....	54,023	88	13	24.1
Keweenaw county.....	7,143	12	2	28.0
Luce county.....	3,117	5	.8	25.3
Mackinac county.....	2,777	5	.9	32.4
Marquette county.....	7,543	4	.4	5.3
Menominee county.....	39,750	150	18	45.3
Ontonagon county.....	24,914	67	.13	52.2
Schoolcraft county.....	6,208	14	1	16.1
	7,777	23	2	25.7
NORTHWESTERN DIVISION.				
Benzie county.....	81,826	89	21	25.7
Grand Traverse county.....	9,181	15	3	32.7
Leelanau county.....	19,611	24	5	25.5
Manistee county.....	10,105	5	2	19.8
Wexford county.....	27,067	24	6	22.2
	15,862	21	5	31.5
NORTHERN DIVISION.				
Antrim county.....	69,959	109	20	28.6
Charlevoix county.....	14,070	18	4	28.4
Cheboygan county.....	12,735	14	3	23.6
Crawford county.....	15,110	18	2	13.2
Emmet county.....	2,963	5	.6	20.2
Kalkaska county.....	13,141	28	5	38.1
Otsego county.....	6,357	9	1	15.7
	5,583	17	3	53.7
NORTHEASTERN DIVISION.				
Alcona county.....	54,522	44	11	20.4
Alpena county.....	5,564	4	.9	16.2
Iosco county.....	18,550	13	4	21.6
Montmorency county.....	11,515	8	3	26.1
Ogemaw county.....	2,906	3	.6	20.7
Oscoda county.....	6,725	5	1	14.9
Presque Isle county.....	1,781	4	.1	5.6
	7,481	7	2	26.7
WESTERN DIVISION.				
Kent county.....	266,177	406	80	30.1
Lake county.....	128,354	280	46	35.8
Mason county.....	5,574	7	1	17.9
Muskegon county.....	19,070	18	6	31.5
Newaygo county.....	37,281	25	7	18.8
Oceana county.....	18,719	19	5	26.7
Ottawa county.....	16,989	26	5	29.4
	40,190	31	9	22.4
NORTHERN CENTRAL DIVISION.				
Clare county.....	99,169	142	26	26.2
Gladwin county.....	8,378	11	2	23.9
Isabella county.....	5,998	10	1	16.7
Mecosta county.....	22,582	32	5	22.1
Midland county.....	20,864	23	6	28.8
Muskegon county.....	14,045	26	5	35.6
Oceana county.....	8,246	24	4	48.5
Roscommon county.....	17,390	14	3	17.2
	1,665	2	.4	24.0

*See † footnote below Table 42 on a preceding page.

TABLE 44.—CONCLUDED.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	340,572	401	80	23.5
Arenac county.....	8,230	7	.7	8.5
Bay county.....	62,558	61	19	30.2
Huron county.....	33,655	33	6	17.8
Lapeer county.....	28,275	32	6	21.2
Saginaw county.....	82,869	66	15	18.1
Sanilac county.....	34,587	54	10	28.9
St. Clair county.....	54,796	105	16	29.2
Tuscola county.....	35,302	43	8	22.6
CENTRAL DIVISION.	314,763	439	77	24.5
Barry county.....	23,147	26	3	13.0
Clinton county.....	25,812	44	8	31.0
Eaton county.....	32,182	52	7	21.8
Genesee county.....	41,294	39	7	17.0
Gratiot county.....	29,445	47	8	27.2
Ingham county.....	40,714	96	16	39.3
Ionia county.....	34,891	46	9	25.8
Livingston county.....	19,905	20	3	15.1
Montcalm county.....	33,899	29	8	23.6
Shiawassee county.....	33,474	43	8	23.9
SOUTHWESTERN DIVISION.	139,747	147	32	22.9
Allegan county.....	39,128	29	7	17.9
Berrien county.....	47,498	48	12	25.3
Cass county.....	20,919	25	4	19.1
Van Buren county.....	32,302	45	9	27.9
SOUTHERN CENTRAL DIVISION.	315,307	401	70	22.2
Branch county.....	26,440	35	7	26.5
Calhoun county.....	49,315	68	13	26.4
Hillsdale county.....	30,036	24	5	16.6
Jackson county.....	47,166	75	12	25.4
Kalamazoo county.....	44,238	81	10	22.6
Lenawee county.....	48,629	66	12	24.7
St. Joseph county.....	24,485	23	5	20.4
Washtenaw county.....	44,993	30	7	15.6
SOUTHEASTERN DIVISION.	434,705	313	109	25.1
Macomb county.....	32,732	44	8	24.4
Monroe county.....	33,121	39	8	24.2
Oakland county.....	43,749	32	7	16.0
Wayne county.....	325,103	195	86	26.5

*See † footnote below Table 42, on a preceding page.

GEOGRAPHICAL DISTRIBUTION OF TYPHOID FEVER.

Table 44 shows that for the period of fourteen years, ending in 1904, typhoid fever was most prevalent in the Upper Peninsula Division, and least prevalent in the Northeastern Division.

Compared with the average for the entire State for the above period (26.1 deaths per 100,000 of the population), typhoid fever was much more prevalent than the average in the counties of Baraga, Chippewa, Delta, Gogebic, Marquette, Menominee, Emmet, Otsego, Kent, Midland, Missaukee, and Ingham.

LOCAL PREVALENCE OF TYPHOID FEVER.

Table 45 shows that, judging by the per cent of localities infected, the numbers of cases and deaths, and the death rates per 100,000 of the population, typhoid fever was considerably more prevalent in the urban than in the rural localities.

TABLE 45.—*The prevalence of typhoid fever in urban and rural localities in Michigan in 1904.*

Localities,—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.*	Deaths.	Death rate per 100,000 of the population.
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	724	126	30.5
Cities from 25,000 to 50,000.....	129,336	4	4	100	213	55	42.5
Cities from 10,000 to 25,000, and Calumet township, (17,150).....	266,888	19	19	100	460	132	49.5
Cities and villages from 5,000 to 10,000.....	139,870	21	21	100	124	39	27.9
Cities and villages under 5,000.....	397,332	367	172	47	546	130	32.7
Total urban.....	1,346,735	413	218	53	2,067	482	35.8
Rural (townships†).....	1,183,281	1,217	457	38	961	249	21.0

*See † footnote below Table 42, on a preceding page.

†Not including Calumet, which for the purposes of this study is classed with urban localities having corresponding populations.

The death rates shown for the several groups of cities seem to indicate that the prevalence of typhoid fever is not proportionate to the density of the population, the rate for the cities in the first group—Detroit and Grand Rapids—being less than for cities and villages of less than 5,000 population, and the highest death rate being in cities of from 10,000 to 25,000 population. The continuation of the table for a number of years will probably show an entirely different order in the rates, but there will always be exceptional death rates in those groups containing cities which derive their water supplies from sources where contamination by sewage is possible. This fact should be borne in mind when studying Table 44, because the excessive rates in some counties, and sometimes the division in which the county is located, may be due to the excessive rates in some one or two localities in the county or division.

In the first group of cities in Table 45, with the death rate of 30.5 per 100,000 of the population, we have Detroit with the comparatively low death rate of 20.5 per 100,000, and Grand Rapids with the high death rate of 63.7 per 100,000.

In the second group of cities, with a death rate of 42.5 per 100,000, we have Bay City with a death rate of 47 per 100,000, Jackson 43.5, Kalamazoo 23.5, and Saginaw 51.5.

In the third group of cities, with a death rate of 49.5 per 100,000, we have Escanaba with the amazingly high death rate of 360.4 per 100,000, and Menominee with the very high death rate of 135.2 per 100,000. Eliminating these two cities from the group, the remaining sixteen cities would have an average rate of 33.4 per 100,000. The further elimination of two or three other cities, which had somewhat excessive rates, from the group would make the rate compare favorably with the following group.

Typhoid fever is not only more prevalent in urban localities, but it spreads most from such localities, particularly from the larger cities. In 1904, of 118 outbreaks definitely traced to outside jurisdictions, 69 outbreaks, with 90 cases and 15 deaths, were from the large cities, and 49 outbreaks, with 73 cases and 15 deaths, were from the smaller localities.

THE SEASONAL PREVALENCE OF TYPHOID FEVER.

Table 46 is for a short period, because in the years previous to 1902 either the months in which the outbreaks began, or were present, the months in which the first case in each outbreak began, or the numbers of cases present in each month, were used to show the seasonal prevalence. Since 1901, the numbers of cases taken sick in each month have been compiled and are here tabulated. It will be seen that the months in which the greatest numbers of cases occurred was from August to October, inclusive, 43 per cent of all the cases having begun in those months. The months of least prevalence were May and June. Notwithstanding the showing made by the table, it is a fact that many of the notable epidemics in the larger cities have occurred in the later winter and early spring months. In 1904, the epidemic at Escanaba, which resulted in 204 cases and 40 deaths, occurred in March. At Grand Rapids, 15 per cent of the 659 cases occurred during the three weeks ending March 12.

TABLE 46.—*The seasonal prevalence of typhoid fever in Michigan, as indicated by the numbers of those taken sick in each month in the three years, 1902-1904.*

Years.	Number of cases taken sick in each month.											
	Jan.	Feb.	Mar.	April	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
1902.....	143	126	152	92	103	105	133	299	352	257	200	162
1903.....	125	174	148	100	104	110	153	324	525	454	221	166
1904.....	157	205	239	234	133	118	150	304	351	332	225	238
Average per year.....	142	168	180	145	113	111	148	309	409	348	215	189

REPORTED SOURCES OF CONTAGIUM IN TYPHOID FEVER.

Table 47 indicates that in but little more than forty per cent of all the cases of typhoid fever is the source of the disease definitely traced or reported.

Three facts stand out prominently in the table: The communicability

of typhoid fever through the agency of water; the spread of typhoid fever through the movement of typhoid fever patients, or convalescents, from one locality to another; and the communicability of typhoid fever from person to person direct.

The association of insanitary surroundings, defective drainage, etc., with outbreaks of typhoid fever in 1,387 instances may be fully warranted, but it would be interesting to know just to what extent the insanitary surroundings affected the purity of the water supply, or furnished suitable places for the lodgment and development of the typhoid bacilli, and from which the infection could be readily transported, by flies or currents of air, to other spheres of action.

SOME INTERESTING SOURCES OF CONTAGIUM IN TYPHOID FEVER IN 1904.

These, together with the numbers of cases and deaths from each source, will be given in the order in which similar sources appear in Table 47, and, as nearly as possible, in the wording of the reports from which the sources were gleaned:

Contaminated water.

Shallow well in camp (6 cases).

Water from open well near which slops were thrown (1 case).

Surface water (5 cases).

Well into which river had overflowed (2 cases).

Water from creek in a cedar swamp (3 cases, 1 death).

Poor well water that had been condemned (3 cases).

Private garden well, the water of which, being softer, was preferred to the city water (4 cases).

Surface spring (1 case).

Drinking from stagnant creek (3 cases).

Drinking marsh water while gathering berries (1 fatal case).

Drinking water from a ditch (4 cases).

Water from a well which was lower than the barn (1 case).

Water from an open well which was lower than the privy, stable and hen house, and only 80 feet distant from these sources of pollution (1 fatal case).

Bathing in and drinking river water near a sewer outlet (1 case).

Bathing in stagnant water (2 cases).

Drinking Clinton river water from below Mt. Clemens (6 cases, 3 deaths).

Outside jurisdictions.

As previously stated on a preceding page, 118 outbreaks, with 163 cases and 30 deaths, in 1904, were definitely traced to outside jurisdictions. Of these the most important were:

Grand Rapids* (31 outbreaks, 39 cases, 2 deaths).

Jackson (5 outbreaks, 5 cases, 1 death).

Escanaba* (3 outbreaks, 13 cases, 2 deaths).

Detroit (4 outbreaks, 4 cases, 2 deaths),

Saginaw (3 outbreaks, 3 cases, 1 death).

*Special mention of the outbreaks in these localities is made on a following page.

Lansing (3 outbreaks, 3 cases).

Toledo, Ohio, (3 outbreaks, 3 cases, 1 death).

Cleveland, Ohio, (1 outbreak, 3 cases).

Traced to a previous case.

Contracted from a sister at Grand Rapids while visiting there (1 case).

Convalescent relatives from Grand Rapids visiting (4 cases, 1 death).

Nursing mother who had the disease (1 case).

Direct contact with a patient at Toledo, Ohio (1 fatal case).

Nursing typhoid fever patient previous to sickness (1 case).

Attending funeral of typhoid decedent (1 case).

Working where there were two cases of typhoid fever (1 case).

Nursing two children who had the disease (1 case).

Insanitary surroundings.

Family of imbeciles, and were filthy beyond description (4 cases, 1 death).

Infected articles, clothing, etc.

Washed for family where they had the disease (1 case).

Brought in bedding from Virginia (2 cases).

Infected premises.

From a house in Chicago where there had been a case (2 cases).

From premises where there had been a previous case (1 case).

Typhoid fever present on the same premises at some time during the preceding twelve months (1 case).

Cluster of ten houses where the cases occurred had been subject to previous outbreaks (2 cases).

From camps.

Lumber camps (10 cases).

Military camp (1 case).

Camps not otherwise specified (3 cases, 1 death).

Working on boats on the Great Lakes.

Drinking impure water while working on car ferry plying between Frankfort and other lake ports (2 cases, 1 death).

Removed from boats to the hospital at Sault Ste. Marie (13 cases, 2 of which terminated fatally).

Brought into Manistee by marine men (12 cases, 3 of which terminated fatally).

Brought into Grand Haven by a sailor (1 case).

Immigrant.

Contracted on board ship while crossing the ocean (1 fatal case).

TABLE 47.—*The reported sources of contagium in typhoid fever in the eighteen years, 1887-1904.*

Reported sources.	Number of instances.
From contaminated water.....	10,195
Probably from contaminated water.....	119
From outside jurisdictions.....	3,078
Probably from outside jurisdictions.....	49
Traced to a previous case.....	2,320
Probably by infection from a previous case.....	86
Insanitary surroundings, defective drainage, etc.	1,387
Contaminated milk and other foods.....	159
From flies.....	36
Low water in wells.....	16
Colds, and exposure to cold.....	14
Sporadic.....	10
Infected articles, "old clothing," etc.....	8
From swampy land.....	8
Debilitated condition.....	4
Bathing in stagnant water, 2; bathing in river water near sewer, 1.....	3
Abscess.....	1
Billiousness due to eating ice and snow.....	1
Dysentery.....	1
Number of instances in which the source was mentioned.....	17,495
No statement relative to the source of contagium*.....	13,427
Source reported as unknown.....	12,091
Grand total.....	43,013

*In each year many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreak first began.

THE INFLUENCE OF AGE AND SEX IN FATAL AND NON-FATAL CASES OF TYPHOID FEVER.

Tables 48 and 49 indicate that the greatest numbers of persons sick from typhoid fever are between the ages of 10 and 29 years, and that the fatality is also greatest among persons between those ages.

The average age of those sick during the 17 years, 1887-1903, was for males 23.4 years, and for females 21.8 years.

Up to the twentieth year, and at the ages of 50 years and upwards, the disease was most prevalent among the females; it was also most fatal amongst the females between the ages of 1 and 19 years, and also between the ages of 60 and 69 years. At all ages the disease was most prevalent among the males.

TABLE 48.—*The influence of age and sex in fatal and non-fatal cases of typhoid fever during the seventeen years, 1887-1903.*

Age periods.	Average per cent at known ages.		
	Males,	Females,	Both sexes,
Under 10 years.....	14	17	16
10-14 years.....	12	17	15
15-19 years.....	15	19	17
20-24 years.....	19	14	17
25-29 years.....	19	9	14
30-34 years.....	9	6	8
35-39 years.....	6	5	6
40-44 years.....	4	4	4
45-49 years.....	3	3	3
50 years and over.....	5	6	6
Average number of cases included.....	906	685	1,591

TABLE 49.—*The influence of age and sex in typhoid fever, as indicated by the numbers of those who died from this disease in the twelve years, 1892-1903. Arranged, by sex, in age periods of ten years each.*

Age periods.	Numbers.			Per cent of all deaths of known ages.			Average deaths per year.		
	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,
Under 10 years.....	256	259	515	4.84	4.90	9.74	21	22	43
10-19 years.....	617	669	1,286	11.67	12.67	24.34	51	56	107
20-29 years.....	1,021	514	1,535	19.31	9.72	29.03	85	43	128
30-39 years.....	565	286	851	10.68	5.41	16.09	47	24	71
40-49 years.....	305	198	503	5.77	3.74	9.51	25	17	42
50-59 years.....	168	116	284	3.18	2.19	5.37	14	10	24
60-69 years.....	94	101	195	1.78	1.91	3.69	8	8	16
70 and over.....	63	55	118	1.19	1.04	2.23	5	5	10
All ages.....	3,089	2,198	5,287	58.43	41.57	100.00	257	183	441

THE DURATION OF SICKNESS IN TYPHOID FEVER.

Table 50 indicates that in the greatest number of non-fatal cases of typhoid fever the sickness lasted from 26 to 30 days. Sixty per cent of all the cases included in the table recovered in from 21 to 40 days.

Table 51 indicates that a majority of the fatal cases of typhoid fever died between the first and tenth days of the sickness. Nearly one-half

died before the sixteenth day, sixty per cent before the twentieth day, seventy-five per cent before the twenty-fifth day, and eighty-six per cent before the thirtieth day.

TABLE 50.—*The average duration of sickness in non-fatal cases of typhoid fever, during the seventeen years, 1887-1903.*

Duration periods.	Average per cent of all cases of known duration.		
	Males.	Females.	Both sexes.
1 to 10 days.....	2	2	2
11 to 15 days.....	6	6	6
16 to 20 days.....	9	9	9
21 to 25 days.....	15	16	16
26 to 30 days.....	19	18	19
31 to 35 days.....	14	14	14
36 to 40 days.....	11	11	11
41 to 45 days.....	8	7	8
46 to 50 days.....	5	4	5
51 to 55 days.....	3	4	4
56 days and over.....	8	8	8
Average number of cases included.....	498	376	874

TABLE 51.—*The average duration of sickness in fatal cases of typhoid fever, during the seventeen years, 1887-1903.*

Duration periods.	Average per cent of all cases of known duration.		
	Males.	Females.	Both sexes.
1 to 10 days.....	22	25	24
11 to 15 days.....	18	22	20
16 to 20 days.....	17	16	17
21 to 25 days.....	16	12	14
26 to 30 days.....	11	10	11
31 to 35 days.....	6	6	6
36 to 40 days.....	5	4	5
41 to 45 days.....	3	4	4
46 to 50 days.....	3	1	2
51 to 55 days.....	1	1	1
56 days and over.....	3	3	3
Average number of cases included.....	137	99	236

RESTRICTIVE AND PREVENTIVE MEASURES IN TYPHOID FEVER IN 1904

Table 52 indicates that, in 1904, in not more than fifty per cent of the outbreaks of typhoid fever were the two most essential precautions taken to prevent the spread of the disease,—the disinfection of the discharges, and of clothing and other articles which might be soiled by the discharges. In a yet smaller number of instances were the patients isolated, and the rooms which they occupied properly disinfected after the recovery or death of the patients.

TABLE 52.—*Relative to restrictive and preventive measures in typhoid fever in 1904.*

Restrictive and preventive measures.	Number of outbreaks.	Per cent of all outbreaks.
DISCHARGES FROM THE BOWELS AND BLADDER:		
Disinfected.....	409	45
Not disinfected.....	89	10
No statement, or statements doubtful.....	401	44
CLOTHING AND OTHER ARTICLES SOILED BY DISCHARGES:		
Disinfected.....	453	50
Not disinfected.....	57	6
No statement, or statements doubtful.....	395	43
ISOLATION OF SICK PERSONS, AND DISINFECTION OF INFECTED ROOMS:		
Both enforced.....	190	21
Both neglected.....	44	5
Isolation enforced, disinfection neglected or doubtful.....	140	15
Disinfection enforced, isolation neglected or doubtful.....	60	7
Isolation and disinfection not mentioned, or statements doubtful.....	443	49
DRINKING WATER:		
Boiled, during or near the time of the outbreak.....	115	13
Not boiled.....	365	40
No stated, or statements doubtful.....	423	46
PROTECTION AGAINST FLIES:[*]		
Houses screened.....	217	24
Not screened.....	133	15
No statement, or statements doubtful.....	428	47

*Of the 910 outbreaks of typhoid fever in 1904, 129 outbreaks occurred in months when there were no flies, and therefore no necessity for screens.

In 59 per cent of all the outbreaks in which the source of the contagium was reported, the water used for drinking or domestic purposes was cited as the cause, and yet the oft repeated injunction, "Boil the

drinking water," was heeded in but thirteen per cent of the outbreaks, and in some instances not until the outbreak was ended.

The precautions relative to the exclusion of flies from houses in twenty-nine per cent of the outbreaks which occurred during "fly time" would probably have been taken had there been no typhoid fever. It would be a long step in the right direction if every house and store, and any other place where food is kept, or exposed for sale, were well and effectually screened against flies, and the further precaution taken to prevent the wholesale breeding of flies by the frequent removal of stable manure, and its collection in well covered receptacles.

The substitution of earth closets for the common privies would, it is believed, largely restrict the communication of disease through the agency of flies. Even where the common privy is tolerated, the danger from it may be minimized by the frequent application to the excreta of dry lime, or some other good deodorant or disinfectant which will prevent flies from lighting upon the contents of the privy pit.

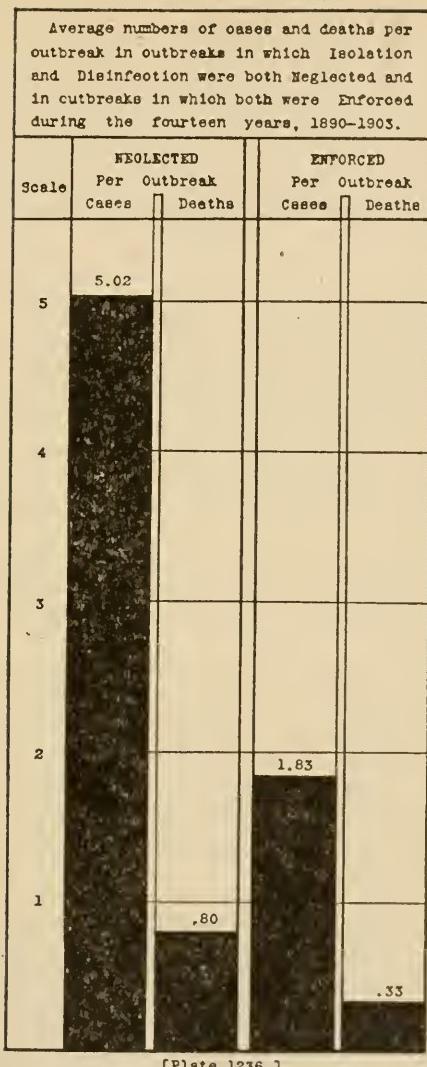
RESULTS OF EFFORTS FOR THE RESTRICTION AND PREVENTION OF TYPHOID FEVER.

What has been accomplished in Michigan for the restriction and prevention of typhoid fever may be gleaned from the following extract from a letter to the Detroit Medical Journal, in October, 1904, by Dr. H. B. Baker, at that time the Secretary of this Department, and from the accompanying diagram:

"It is now twenty-five years since the Michigan State Board of Health began systematically to teach the adult population of this State the best known measures for the prevention of typhoid fever. Although since that time much has been learned by sanitarians and by the medical profession relative to typhoid fever, enough was known at that time to prove of great use to the people for its prevention. This is evidenced by the fact that the statistics of the State Department show a lessening of the mortality from typhoid fever in Michigan from the time of the beginning of the educational work by the State Board of Health.—1879. Comparing the rate previous to 1879 with that after that date up to and including the year 1896, the apparent average saving in the later period was about 170 lives per year. Since 1896 the apparent saving has been greater, the average, for the years 1897-1903, inclusive, being about three hundred per year. My belief is that Michigan was the pioneer State in that work. I know of no other State or other board of health which undertook at so early a date to systematically labor by educational efforts for the prevention of typhoid fever.

"The Michigan Board of Health was the first to collect evidence as to the effect of isolation and disinfection for the *restriction* of typhoid fever. Such evidence has been collected since 1890. About ten years ago some results of this work were presented to a meeting of representatives of State and other boards of health, and they seemed to be astonished that there should be a lessening of typhoid fever by those two measures. Within a few years other evidence has been accumulating, and, although at present it is being taught by the bureau of health of the German Empire, and by eminent investigators in this country that 'typhoid fever is a contagious as well as an infectious disease,' the first proof that the disease can be restricted by isolation and disinfection was developed by the contagious-disease statistics commenced fourteen years ago and published by the Michigan State Board of Health."

TYPHOID FEVER RESTRICTED
BY ISOLATION AND DISINFECTION



In this connection the following clipping from the Port Huron Daily Times of March 8, 1904, will be of interest:

THE COST OF TYPHOID FEVER

In his address on the "Water Supply of Cities" before the Michigan Municipal League, at the meeting recently held at Ann Arbor, Dr. Victor C. Vaughan, Dean of the Medical Department of the University of Michigan, pointed out the loss to the country every year from typhoid fever. He said:

"There die in the country every year from typhoid fever alone not less than

50,000 people. To get down to dollars and cents, which is the American way of figuring everything, say each man was worth a thousand dollars. With 50,000 deaths from this disease we are losing by death alone fifty million dollars every year.

"Besides there are 500,000 others sick in this country every year from typhoid fever. Then we will say that the time of each one of these individuals is worth a dollar a day, also that there must be at least one nurse, and we will suppose that these services are worth one dollar a day. Then for each day that those 500,000 people are sick, the people of the United States are paying one million dollars. And forty days is certainly an average duration for typhoid fever. Then with this forty million and the fifty millions lost by death, it is interesting to note that the people of the United States are paying a tribute of \$90,000,000 to our ignorance for the existence of a disease which, if every man did his duty, would not exist at all."

EPIDEMIC OF TYPHOID FEVER AT ESCANABA.

Beginning in February, and continuing through March, April and May, 1904, an epidemic of typhoid fever, of unusual severity, prevailed in the city of Escanaba, Delta County, and resulted in 204 cases and 40 deaths. The reports to this Department relative to this epidemic were very meagre, the first information relative to the outbreak being obtained from the Daily News of March 10, 1904, in which it was alleged there had been at that time fifty cases of the disease. A newspaper report on March 24 placed the number of cases then present at two hundred.

To the cases and deaths which occurred in Escanaba in 1904 should be added the 13 cases and 2 deaths, previously mentioned, which occurred in other jurisdictions but were directly traced to Escanaba as the source of infection.

An article by Dr. O. C. Breitenbach, who was appointed health officer of Escanaba in July, 1904, on the subject of the epidemic and the general sanitary conditions at Escanaba, appeared in the Escanaba Daily Union of October 4, 1904, extracts from which are here printed:

The high death rate of Escanaba, as well as the question of its causation, has received much honest thought at home, and by the people throughout the state.

In any discussion of the subject, it must not be lost sight of that there are many factors, interdependent, that undermine the health of a city such as Escanaba.

The growth of other sister cities has not been concomitant with ours. While these have decreased in population, or remained stationary, Escanaba was netted with a sudden influx, so that its population, numbering only 6,808 in 1890, now approximates 11,000. Improvements, by force of circumstances, naturally could not keep pace with such rapid growth. Thus was brought into existence the dominant factor of disease—defective sanitation.

To adapt and shape the environment of a municipality characterized by this sudden influx of people, is not the work of a single year, or a single administration. Many demands for public funds showed themselves, not at all commensurate with the city's revenue. Public schools, police and fire protection, and at the present time and in an enthusiastic manner public highways, all call for large disbursements. The need of protection from a danger greater than any other the city need fear, behind which lurks the grim visage of Death, taking away from home the loved ones in childhood and adolescence, types of manhood and womanhood the city can ill afford to lose, becomes imperative with the sorrowful picture of the recent epidemic.

Rural sanitation, as it exists in the city today, needs to be supplanted by a system more in accord with the needs of the community.

Health work needs to be supported by those that grasp its full scope and possess intelligence enough to appreciate statistics. As a social unit, we all have duties placed upon us. Philanthropy finds expression in no more practical

way than by united conscientious support of this work. The conditions holding forth in Escanaba representing the highest death rate of any city of its size in the State, are not what they might reasonably be. Health work, in its fullest meaning, needs to be put on a more economical and more efficient basis. To this end, the Mayor, Council and Board of Health are putting forth honest efforts.

"Cleanliness is next to Godliness," and verily filth is the bulwark of germ growth. The dissemination of disease is controlled by all factors involving filth or pollution.

Among the more important factors controlling an epidemic, are the following:

1. Infected water supply.
2. Defective drainage.
3. Contaminated soil, such as cesspools, decomposing garbage, etc.
4. Failure to resort to proper preventive measures in the sick room.

5. Failure to notify proper authorities of any outspread of a communicable disease.

The Philadelphia epidemic of 1898, and the more recent Butler epidemic, have demonstrated the importance of a pure water supply. When we consider the possible cause holding forth in water pollution, it becomes necessary to bear in mind the several sources of drinking water in a given locality. Faucet water and wells supply the householders in Escanaba.

The possibilities of contamination of faucet water in Escanaba are many. Not alone is the city's sewerage of great danger in itself, but also the currents that are characteristic of Little Bay de Noc, that may carry pollution to the very mouth of the intake pipe. The demand for a purer water supply has led the Escanaba Water company to the construction of a new intake. The completion of this will obviate this to a degree, and its completion will therefore be looked forward to with interest. However, the great importance of filtration needs yet to be vindicated.

When one calls to mind the fact that well water is affected by atmospheric conditions, by the soil it falls upon, and by the soil it percolates through, the dangers that lurk in cesspools, buried privy vaults and like nuisances, at once become apparent.

Defective drainage is another factor in disease. Escanaba is yearly extending its system of sewerage and with periodical flushings, will in time be of inestimable benefit in lowering the death rate.

A third source of disease is found in accumulated filth of every description. An outhouse is a plague spot in every community, unless cleaned and disinfected at regular intervals. Cesspools, decomposing garbage, and manure cast about at random, are other sources. The present method of dealing with these is daily subjected to criticism. The sanitary police, at the present time, appointed by the mayor, investigates these sources of filth, and when, in his judgment, they exist as a public nuisance, a notice for their removal, within twenty-four hours, is served. The city scavenger is allowed the maximum fee of \$4.00 per cubic yard for the cleaning of vaults, and \$2.50 per load for the hauling of garbage and manure. The fee allowed him is a fee common to all scavengers in other cities, and is not exorbitant for the work done. The rate, however, is objected to. A thoroughly practical and inexpensive system, needs yet to be devised.

My criticism and suggestion on the plan in vogue is the following:

Why allow garbage and filth to accumulate until these become a nuisance and dangerous to public health. Why not have some means at our disposal by which the community at regular intervals is rid of a possible cause. Are there not means whereby the Board of Health can have people cooperate instead of rebel, as is common with the form of notice served at the present? Any cesspool cleaned, or any source of filth removed, is done so for the common good. Why not establish a system in which the people of the city shall be the aggressive element, making overtures. This will be accomplished by a city garbage system, let out by contract. The system would imply the placing of garbage cans by householders, and a prompt installment of manure boxes. Collecting would be carried on by a minimum number of single-horse, covered wagons, who do their work of collecting garbage in wards, bi-weekly, and a team and two men, working nights excavating cesspools and the like. The city controlling the system, under jurisdiction of the board of health, would make it a comparative inexpensive way of dealing with filth within the precincts of the city, yet one

allowing thorough work. The feature of such a system that makes the strongest demand, is the prompt cooperation of every taxpayer. Paying his fraction in support of a garbage system, he will demand prompt and efficient service, or know the reason why.

A fourth common source leading to the dissemination of disease is the extreme carelessness manifest in some sick rooms, where an infectious disease exists. The advice of the physician is seldom adhered to.

As a consequence, there is much careless handling and use of infected articles, and many times a criminal neglect shown in the failure to properly disinfect excreta.

A fifth cause of an epidemic is the failure of the householder or physician to appreciate the fact that it is a duty that an average intelligence sanctions, and the law implicitly demands, for him to report outbreaks of communicable diseases, and thus allow every effort to be put forth towards the prevention of their spread.

Those that are guilty of not so doing, be it householder or physician, are guilty in the eyes of every physician, of professional bearing, of a lawlessness exemplified by the stain of innocent blood. The duty is so readily realized by one possessing an average mental poise to wade through the statistics that preventive medicine furnishes. The state grants to the afflicted, gratis, quarantine and disinfection. Is there any reason why it should be withheld? The medical profession has thus many times prevented what might have been a scourge to the city and state affected.

For the sake of comparison, I append a compilation of the death rate for six consecutive years, during the months of February, March, April and May, the months during which the epidemic held full sway during this year.

February, 1899, 17; 1900, 21. Eight deaths by violence, railway wreck at Ford River Switch; 1901, 14; 1902, 14; 1903, 19; 1904, 21.

March, 1899, 18; 1900, 16; 1901, 15; 1902, 15; 1903, 22; 1904, 43.

April, 1899, 18; 1900, 20; 1901, 22; 1902, 23; 1903, 16; 1904, 46.

May, 1899, 12; 1900, 23; 1901, 21; 1902, 20; 1903, 22; 1904, 32.

The high increase in mortality over previous years should readily aid in determining the factors that contributed to it. The fact that the epidemic spread far and wide, and was not at all respective of persons in any walk of life, is proof positive of a common cause. In this light, our several sources of drinking water are important.

We anticipate the completion of the new intake pipe, as this may obviate this matter; yet Escanaba should always be in dire need of a filtration plant, for the removal of disease germs.

Until that time, regular reports ought to be exacted, from time to time, as to the condition of the water supply. Well water must receive its due consideration, by rigid reforms and cleanliness of the city. In these several ways, another epidemic will be averted.

"Every calamity is also a great opportunity." Let it be so in Escanaba, for the maintenance of a pure water supply.

It has been shown that many factors contribute to the rise and fall in the mortality of water-borne diseases. The question why have not similar epidemics reaped a harvest in previous years, is often asked. One forgets the fact that Escanaba has always had an exceedingly high percentage of bowel diseases, and also a high mortality as a consequence. It simply remains for any one of the many factors influencing the water supply, to become aggravated. The outcome will be such an epidemic. It may be sewerage, stagnation of water source, faulty intake, lack of filtration, or infected reservoir; any one of these factors may lead to a veritable hotbed of germ growth. The more pollution in any water, the more sustenance for the multiplication of bacteria. The virulence in the human organism, and the fatality of the late epidemic, is readily explained by bacteriological data.

The month of September shows a low mortality from acute diseases. Bowel disturbances netted the largest number of deaths. This statement may contain the prophecy of another severe winter. It may well be asked if bowel trouble being in the ascendancy now, what will be the condition when our main source of water is well nigh stagnant.

TYPHOID FEVER AT GRAND RAPIDS IN 1904.

Typhoid fever was unusually prevalent at Grand Rapids during each month of 1904, and resulted in a total of 659 cases and 61 deaths from this disease. The time of greatest prevalence of the disease occurred during the week ending February 27, when 40 new cases were reported. This was followed by reports of 36 new cases in the week ending March 5, and 25 new cases in the week ending March 12, after which time the disease began to decrease somewhat. During the latter part of October the number of new cases began to increase, and reached the number of 28 in the week ending December 17, and 26 in the week following.

To the cases and deaths reported as having occurred in Grand Rapids should be added the 39 cases and 2 deaths, previously mentioned, which occurred in other jurisdictions but were directly traced to Grand Rapids as the source of infection.

During the first week in February, 1904, Dr. T. M. Koon, the health officer of the city, called the attention of the board of health to the unusual prevalence of typhoid fever in the city, and made a number of timely suggestions relative to the restriction of the disease by the placarding of houses, the fumigation of houses where the disease occurs, and the adoption of rules for the disinfection of the excreta of patients.

Some time during the month of February the board of health issued the following warning, which was published in the local newspapers:

BOARD OF HEALTH BULLETIN.

Owing to the prevalence of typhoid fever in the city, the public is warned against drinking water that has not been boiled. This applies particularly to water from wells and the river. It would also be safer to boil water from springs while typhoid fever is so prevalent.

By order of Board of Health.

T. M. KOON, Health Officer.

It was not, however, until the month of November, 1904, that action was taken by the board of health relative to the placarding and fumigation of premises in cases of typhoid fever, as shown by the following letter received by this Department:

BOARD OF HEALTH,
Grand Rapids, Mich., Nov. 16, 1904.

Dr. Henry Baker, Sec. State Board of Health, Lansing, Mich.:

DEAR DOCTOR:

Allow me to inform you that beginning with the 11th inst. our local Board has commenced placarding and fumigating the premises for typhoid fever. We have already placarded twelve houses without any opposition on the part of the people.

Very respectfully yours,

T. M. KOON, Health Officer.

The unusual prevalence of typhoid fever during the early part of 1904 was not confined to Escanaba and Grand Rapids, as shown by the following warning sent out by this Department at that time:

DANGER FROM TYPHOID FEVER.

Warning to cities and villages having a general water supply.

The bulletin issued by the Michigan State Board of Health for the month ending February 27, 1904, indicates that typhoid fever was much more prevalent than the average for the corresponding month in the ten preceding years. Of the reports received more than twice the average proportion stated the presence of the disease. A contamination of the water supply would account for the unusual prevalence of this disease. In winter that does not usually occur in country districts, the contents of privies being frozen so they cannot leach into wells. The unusual reports of typhoid fever came from cities having a general water supply. The inference is that these places are using water from a polluted reservoir, river, or lake, and it is earnestly suggested that the local authorities should promptly notify the citizens to *boil the drinking water*. It is hoped that the recent fatal experience at Butler, Pennsylvania, may not be duplicated in Michigan.

Michigan State Board of Health,
Office of the Secretary,
Lansing, March 4, 1904.

HENRY B. BAKER,
Secretary.

Beyond the fact that typhoid fever was slightly more prevalent in 1904 than in the three preceding years, the influence which the unusual meteorological conditions during the winter of 1903-4 exerted upon typhoid fever is not known. It will be remembered that the ground froze early and remained frozen until the advent of Spring, and that the exceptionally heavy snowfall accumulated and remained on the ground for several months. There was good sleighing for twelve continuous weeks. When the Spring rains came, this accumulation of snow was melted in a very short time, and not being able to percolate into the ground, ran off into the creeks and rivers, causing heavy floods in many parts of the State.

During the latter part of the Winter, newspaper reports indicated that in some cities where the general water supplies were obtained from wells, the water was so low as to suggest the necessity of obtaining a temporary supply from a nearby river. Whether this expedient was found to be necessary is not known. Two reasons were advanced for the lowness of the water in these wells,—unusual waste in houses and the lack of percolation of water to the water-bearing strata. The latter reason is supported by the following clipping from the Detroit Journal of September 1, 1904:

WHY CARLETON-ROCKWOOD WELLS HAVE GONE DRY NOW EXPLAINED.

Big Grosse Ile Flowing Well Not to Blame, Say U. S. Geologists—Removal of Forests, Early Freeze, Late Thaw, Shallow Wells, the Causes.

The failure of the water wells in the region east of Carleton, Monroe county, which has been a subject of newspaper discussion for some time, has been investigated by Frank Leverett, and more recently by M. L. Fuller, of the U. S. Geological Survey. Mr. Fuller found on careful inquiry within the district most seriously affected, and also in bordering districts, that the falling off of the water supply has been going on for many years. The level of the ground water in the clayey portions of Southeastern Michigan is distinctly lower than it was ten years ago, and much lower than twenty years ago. Wells which originally flowed have gradually failed as time went on, and it is only in a very limited district that the pronounced falling off in the rate of flow has occurred this season, though there is some shortage in neighboring districts.

The two most important general causes of shortage appear to be the cutting off of the forests which tended to prevent the water from running off rapidly when they completely covered the region, and also to prevent an extensive evaporation; and second the elaborate ditching which now carries off the water quickly instead of allowing it to stand and soak into the ground as was formerly the case. The history of the Carleton region is the same as that of many other similar and once forested regions in other parts of the country.

The special shortness of water supply during the present summer appears to be due in part to the early freezing of the ground last winter, which prevented the soaking in of the late fall rains. The shortage may also be due in part to the fact that the ground did not thaw in the spring until the heavy rains had fallen. There was, therefore, little chance for the rainfall to soak into the ground during the winter and spring months. The spring was followed by an unusually dry summer, the supply of rain in June, according to the records of the weather bureau, being scarcely more than one-tenth the usual amount. It is to the combination of these factors that a considerable part of the shortage of water appears to be due.

This being the case, the return of rainy weather in the autumn is likely to cause a marked increase in the supply, though the full supply may not return until another wet year comes on. In some cases a return of the wet seasons may not bring a restoration of wells, for water passages, when dried out to a certain extent, may crumble and become more or less clogged, so that their capacity for carrying water is lessened even when the ground is again soaked. It seems evident that permanent and abundant supplies are not to be expected in this district until the wells are carried farther into the rock, for the wells at Carleton, and in fact throughout the region, are unusually shallow, a depth of 50 feet being rare, while in many other regions in Michigan depths of 50 to 100 feet are common.

Influence of the large Grosse Ile Well.

The impression is very prevalent that the escape of water from the large well on Grosse Ile, owned by James Swan of Detroit, has had a large effect in lowering the wells of the Carleton-Rockwood district. The investigation just made throws great doubt upon this interpretation. It is found that wells much nearer

Grosse Ile than those which have ceased flowing, and even those in the district between Rockwood and Grosse Ile, are maintaining nearly their usual flow, which is unlikely to be the case if the Grosse Ile well is the cause of the lowering of the water in the Carleton-Rockwood district. The condition of underground drainage would need to be very exceptional that would leave a nearby district unharmed, and do great injury in a more remote district. Furthermore, there is good evidence that the water supply in the Carleton-Rockwood district comes mainly from the higher country to the northwest. If one passes from Carleton northwestward toward Ann Arbor, there is found to be a gradual increase in the height to which the water will rise, such as occurs when one is passing toward the catchment area. This matter was fully investigated by Mr. Fuller, who found that the water head shows no perceptible increase toward the northwest, or in the opposite direction from the Grosse Ile well.

The precise location of the catchment area which supplies water to the Grosse Ile well cannot be given, though there is strong probability that it lies between Grosse Ile and Leamington, Ont. The rock strata which supply the water in the Grosse Ile well come to the surface a few miles to the east of Grosse Ile, and when followed toward Carleton they descend from a depth of 450 feet at the Grosse Ile well to about 800 feet at Carleton. These facts should make it evident that the chance for taking the water from the Carleton-Rockwood district is very slight if not impossible.

The fact that a certain flowing well (on the farm of J. E. Brown, near Carleton, 10 miles from Grosse Ile) ceased flowing in August, 1903, at the time when the casing is reported to have been temporarily pulled from the Grosse Ile well, is believed to have been simply a coincidence, taking place as it did at the height of the dry season. The conditions were almost certainly local, as other wells in the vicinity were not similarly affected.

The wells in the Carleton-Rockwood district obtain their supplies at the very surface of the rock, and the water appears to be derived from the overlying drift deposits. It probably traverses the surface portion of the rock because there is less resistance to its flow through the crevices and other openings in the rock than through the somewhat clayey and compact deposits which generally overlie the rocks of this region. In its passage through the rock the water has taken up sulphur and other matter readily dissolved which is contained in the rock, and its quality is thus greatly changed from its condition when in the drift. The water derived from the drift naturally comes down from the higher land to the northwest, but water which is traversing rock strata at great depths, as in the well on Grosse Ile, is liable to have its source in the direction where the rock ledges outcrop, which in this case, is toward the east. Thus there is a possibility and even a probability that the supplies for the deep well are from an opposite direction from those of the shallow wells.

A law for the regulation of artesian and other wells, is quoted in the first part of this report under the heading, "Public health legislation in Michigan in 1905."

TYPHOID FEVER SPREADS FROM CAMPS.

A warning relative to the danger from camps as a possible source of typhoid fever was issued by this Department in 1904, a copy of which follows:

Temporary camps spread typhoid fever.

In Michigan in one year (1898) ten cases of typhoid fever were spread from a camp meeting. It is a common experience that whenever citizen-soldiers go into camp in this State, typhoid fever occurs in the camp, and spreads therefrom. Typhoid fever has frequently occurred in and spread from lumber camps. The evidence seems to be conclusive that some condition common to camps favors the spread of typhoid fever. One such condition is the exposure of excreta to flies, and the opportunity for the conveyance of the germs of the disease by flies from the excreta to bread and other articles of food to be eaten uncooked. This danger should be guarded against in every temporary camp. Human excreta should not be permitted to be exposed to flies, even for an hour.

As previously stated in this article, in 1904, camps were given as the source of fourteen cases of typhoid fever, one of which proved fatal.

MEASURES FOR THE PREVENTION OF TYPHOID FEVER AT THE UNIVERSITY OF MICHIGAN.

The following clipping from the Munising Republican of March 4, 1904, is of unusual interest, and should receive the most careful consideration of health officers and others having charge of, or in any way responsible for the purity of, the public water supplies:

It does not seem likely that a typhoid fever epidemic will ever break out among the students of the University of Michigan. In a recent address Dr. V. C. Vaughan, Dean of the Medical Department, said on this point:

"Every two weeks since the water was first put in this town, there has been a thorough chemical and bacteriological examination of the water. And when there has been any suspicion that the water was not just right we have examined it every day. On one occasion at least we were threatened with just such an epidemic as occurred in Ithaca, N. Y., a year ago. Five cases of typhoid fever appeared among the University students within a few days. The water was bad. The water was the source of the trouble. It was at that time taken from four or five springs. Immediately we began an examination of the water from each one of these springs, and found the one that furnished the bad water, and the water from it was immediately cut off. One night every hydrant in the city was opened and the reservoirs were emptied; then they were refilled and allowed to run out again, and the walls were thoroughly cleaned. And there was not another case of typhoid fever."

A NEW THEORY RELATIVE TO THE VITALITY OF TYPHOID FEVER GERMS.

The following clipping from the Bay City Tribune of February 5, 1904, is printed without comment, save that it is hoped that the experiments along the lines described will be continued, not only in laboratories but also under the actual conditions by which typhoid fever is spread through the agency of water in wells, streams, rivers and lakes.

NEW SCIENTIFIC THEORY.

Learned Men Upset Previous Views On Typhoid Germs.

Chicago, Feb. 4.—A discovery which may decide the interstate canal case before the United States supreme court was announced today by Prof. Edwin O. Jordan of the University of Chicago. While on the witness stand in the hearing of the injunction case of the state of Missouri against the state of Illinois and the Chicago sanitary district today, Prof. Jordan declared he had proved that typhoid germs cannot live more than two days in sewage polluted water and cannot live more than 10 days in pure water. He testified that water polluted with sewage is in itself a positive aid to the elimination of typhoid germs. The discovery, besides being crucial in the present suit, is contrary to all previous scientific theories regarding the life of typhoid bacilli.

Associated with Prof. Jordan in the extensive experiments which led up to his discovery, were Prof. Russell of the University of Wisconsin and Prof. Zeit of Northwestern University.

DIPHTHERIA AND CROUP IN MICHIGAN IN 1904 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year ending December 31, 1904, there were reported to the State Department of Health 585 outbreaks of diphtheria, in 442 localities, which resulted in 3,510 cases, including 538 deaths.

Compared with the preceding year, in 1904 there were 43 outbreaks more, and the disease was prevalent in 25 localities more, but the number of cases was 160 less and the deaths 31 less.

Compared with the average for the ten years, 1894-1903, in 1904 the number of cases was 329 more and the deaths 59 less.

By reference to Table 53 it will be seen that in the years 1894-1904 the average numbers of cases and deaths, the average deaths per 100 cases, and the average death rate per 100,000 of the population, were much less than the average in the ten preceding years. The reason for this decrease will be considered in connection with Table 62, on a subsequent page of this article.

Going back still further, by reference to Table 54, we find that in the 15 years, 1869-1883, the average death rate was about 58.5 per 100,000 of the population, a rate not equalled in any subsequent year. This high rate was due to the unusual rates for each of the years 1879-1882, the maximum of 145.2 deaths per 100,000 being reached in 1881. In the year last named, active measures for the restriction of diphtheria were begun by the State Department of Health, and the Tables 53 and 54 show a much lower death rate for each year since that time, especially in the last decade.

TABLE 53.—*The general prevalence of diphtheria in Michigan during the ten years, 1884-1893, and before the use of antitoxin; also a similar statement for the eleven years, 1894-1904, since the beginning of the use of antitoxin.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	3,915	905	23.1	48.8
1885.....	1,893,697	4,018	964	24.0	50.9
1886.....	1,933,735	4,244	982	23.1	50.8
1887.....	1,973,774	3,382	825	24.4	41.8
1888.....	2,013,812	2,228	532	23.9	26.4
1889.....	2,053,851	3,157	633	21.6	33.3
1890.....	2,093,889	4,206	1,050	25.0	50.1
1891.....	2,130,827	4,385	1,002	22.9	47.0
1892.....	2,167,765	4,818	1,099	22.8	50.7
1893.....	2,204,703	4,736	1,002	23.1	49.5
Averages 1884-1893.....	2,031,971	3,909	913	23.4	44.9
1894.....	2,241,641	3,852	744	19.3	33.2
1895.....	2,271,531	3,433	708	20.6	31.2
1896.....	2,301,421	4,013	757	18.9	32.9
1897.....	2,331,311	4,132	756	18.3	32.4
1898.....	2,361,201	2,357	477	20.2	20.2
1899.....	2,391,091	2,154	435	20.2	18.2
1900.....	2,420,982	2,706	528	19.5	21.8
1901.....	2,450,572	2,498	493	19.7	20.1
1902.....	2,475,499	2,993	500	* 16.4	20.2
1903.....	2,502,758	3,670	569	15.5	22.7
1904.....	2,530,016	3,510	538	15.3	21.3
Averages 1894-1904.....	2,388,938	3,211	591	* 18.4	24.7

*Exclusive of the cases in the cities of Muskegon and Sault Ste. Marie, from which only the fatal cases were reported in 1902.

TABLE 54.—*The numbers of deaths from diphtheria and croup per 100,000 persons living, in Michigan, in each of the fifteen years, 1869-1883. Compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	17.0	20.9	22.5	28.2	29.6	26.2	26.9	34.7	50.6	72.8	110.5
Years.....	1880.	1881.	1882.	1883.							
Deaths.....	113.9	145.2	102.1		75.7						

GEOGRAPHICAL DISTRIBUTION OF DIPHTHERIA.

Table 55 shows that, as indicated by the numbers of cases and deaths per 100,000 of the population in the fourteen years, 1891-1904, diphtheria was more prevalent than the average for the entire State (150 cases and 29.6 deaths per 100,000) in the Southeastern, Northeastern and Bay and Eastern divisions.

The counties in which diphtheria was unusually prevalent in the fourteen years, 1891-1904, are:

Roscommon*	.....	with rates of 721 cases and 180.2 deaths per 100,000
Gogebic	" "	314 " " 51.3 " " "
Cheboygan†	" "	311 " " 59.6 " " "
Midland	" "	306 " " 49.8 " " "
Wayne	" "	299 " " 65.2 " " "
Bay	" "	294 " " 49.3 " " "
Arenac	" "	255 " " 48.6 " " "
Otsego	" "	251 " " 53.7 " " "
Alpena	" "	248 " " 48.5 " " "
Presque Isle	" "	241 " " 66.8 " " "
Huron†	" "	235 " " 47.5 " " "
Iosco	" "	234 " " 43.4 " " "
Montmorency	" "	206 " " 68.8 " " "
Alcona†	" "	162 " " 53.9 " " "

*The amazingly high rate in this county was due to a case of so-called "sore throat" in 1893, of which particulars were given in the annual report of this Department for 1894. There were 33 cases and 10 deaths reported from Roscommon village, and 141 cases and 36 deaths in the entire county in that year, or about one case for every twelve persons in the county.

†The high rates in these counties were due to epidemics in one or more of the fourteen years for which the rates are computed,—Cheboygan in 1894-5; Huron in 1893-6; and Alcona in 1893.

TABLE 55.—*The geographical distribution of diphtheria, in Michigan, in the fourteen years 1891-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living in each geographical division shown in the table.*

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	233,766	382.5	70.5	30.2
Alger county.....	4,298	3	6	14.0
Baraga county.....	4,558	.9	.1	2.2
Chippewa county.....	18,110	15*	4	22.1
Delta county.....	22,078	18	4	18.1
Dickinson county.....	16,475	36	6	36.4
Gogebic county.....	15,583	49	8	51.3
Houghton county.....	54,023	88	14	25.9
Iron county.....	6,555	7	2	30.5
Keweenaw county.....	3,117	5	.9	28.9
Luce county.....	2,777	.6	.1	3.6
Mackinac county.....	7,543	3	.5	6.6
Marquette county.....	39,750	99	15	37.7
Menominee county.....	24,914	46	7	28.1
Ontonagon county.....	6,208	6	.9	14.5
Schoolcraft county.....	7,777	6	2	25.7
NORTHWESTERN DIVISION.	81,826	73	13.9	17.0
Benzie county.....	9,181	8	.9	9.8
Grand Traverse county.....	19,611	19	5	25.5
Leelanau county.....	10,105	9	2	19.8
Manistee county.....	27,067	21	4	14.8
Wexford county.....	15,862	16	2	12.6
NORTHERN DIVISION.	69,959	93	18.6	26.6
Antrim county.....	14,070	5	2	14.2
Charlevoix county.....	12,735	5	1	7.9
Cheboygan county.....	15,110	47	9	59.6
Crawford county.....	2,963	4	.8	27.0
Emmet county.....	13,141	5	.8	6.1
Kalkaska county.....	6,357	13	2	31.5
Otsego county.....	5,583	14	3	53.7
NORTHEASTERN DIVISION.	54,522	112	25.3	46.4
Alcona county.....	5,564	9	3	53.9
Alpena county.....	18,550	46	9	48.5
Iosco county.....	11,515	27	5	43.4
Montmorency county.....	2,906	6	2	68.8
Ogemaw county.....	6,725	5	1	14.9
Oscoda county.....	1,751	1	.3	16.8
Presque Isle county.....	7,481	18	5	66.8
WESTERN DIVISION.	266,177	317	66	24.8
Kent county.....	128,354	168	36	28.0
Lake county.....	5,574	8	2	35.9
Mason county.....	19,070	16	4	21.0
Muskegon county.....	37,281	65*	12	32.2
Newaygo county.....	15,719	8	2	10.7
Oceana county.....	16,989	10	2	11.8
Ottawa county.....	40,190	42	8	19.9
NORTHERN CENTRAL DIVISION.	99,169	108	22.1	22.3
Clare county.....	8,378	9	2	23.9
Gladwin county.....	5,998	2	.1	1.7
Isabella county.....	22,582	16	3	13.3
Mecosta county.....	20,864	11	3	14.4
Midland county.....	14,045	43	7	49.8
Missaukee county.....	8,246	5	1	12.1
Oscoda county.....	17,390	10	3	17.3
Roscommon county.....	1,665	12	3	180.2

*Only the fatal cases were reported from the cities of Muskegon and Sault Ste. Marie in 1892.

TABLE 55.—CONCLUDED.

Geographical division.	Average.			
	Population	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	340,572	616	112	32.9
Arenac county.....	8,230	21	4	48.6
Bay county.....	62,858	185	31	49.3
Huron county.....	33,655	79	16	47.5
Lapeer county.....	28,275	36	6	21.2
Saginaw county.....	82,869	136	24	29.0
Sanilac county.....	34,587	47	10	28.9
St. Clair county.....	54,796	77	16	29.2
Tuscola county.....	35,302	35	5	14.2
CENTRAL DIVISION.	314,763	315	55	17.5
Barry county.....	23,147	18	3	13.0
Clinton county.....	25,812	20	5	19.4
Eaton county.....	32,182	20	4	12.4
Genesee county.....	41,294	38	7	7.0
Gratiot county.....	29,445	14	3	10.2
Ingham county.....	40,714	61	10	24.6
Ionia county.....	34,891	19	5	14.3
Livingston county.....	19,905	19	3	15.1
Montcalm county.....	33,899	20	4	11.8
Shiawassee county.....	33,474	86	11	32.9
SOUTHWESTERN DIVISION.	139,747	108	26	18.6
Allegan county.....	39,128	25	7	17.9
Berrien county.....	47,498	51	11	23.2
Cass county.....	20,919	15	3	14.3
Van Buren county.....	32,202	17	5	15.5
SOUTHERN CENTRAL DIVISION.	315,307	272	48	15.2
Branch county.....	26,440	18	5	18.9
Calhoun county.....	49,315	57	10	20.3
Hillsdale county.....	30,036	28	4	13.3
Jackson county.....	47,166	38	9	19.1
Kalamazoo county.....	44,238	57	6	13.6
Lenawee county.....	48,629	36	7	14.4
St. Joseph county.....	24,485	10	2	8.2
Washtenaw county.....	44,998	28	5	11.1
SOUTHEASTERN DIVISION.	434,705	1,114	243	55.9
Macomb county.....	32,732	50	12	36.7
Monroe county.....	33,121	57	12	36.2
Oakland county.....	43,749	36	7	16.0
Wayne county.....	325,103	971	212	65.2

*Only the fatal cases were reported from the cities of Muskegon and Sault Ste. Marie in 1892.

THE PREVALENCE OF DIPHTHERIA IN URBAN AND RURAL LOCALITIES IN 1904.

Table 56 indicates that diphtheria was most prevalent in the large centers of population, and least prevalent in the rural localities (townships).

TABLE 56.—*The prevalence of diphtheria in urban and rural localities in Michigan, in 1904.*

Localities,—grouped according to density of population	Population	Health jurisdictions.	Infected localities.		Cases	Deaths	Death rates per 100,000 of the population.
			Number of	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	1,237	155	37.5
Cities from 25,000 to 50,000.....	129,336	4	4	100	179	28	21.6
Cities from 10,000 to 25,000 and Calumet township, (17,150).....	266,888	19	18	95	377	65	24.4
Cities and villages from 5,000 to 10,000.....	139,570	21	18	86	235	24	17.2
Cities and villages under 5,000.....	397,332	367	96	26	455	77	19.4
Total urban.....	1,346,735	413	138	33	2,483	349	25.9
Rural (townships*).....	1,183,281	1,217	304	25	1,027	189	16.0

*Not including Calumet, which, for the purposes of this study, is classed with urban localities having corresponding populations.

THE SEASONAL PREVALENCE OF DIPHTHERIA.

Table 57 indicates that diphtheria is most prevalent during the cold weather, reaching its maximum prevalence in the month of November. It is least prevalent in the Spring and Summer months, the minimum occurring in July.

TABLE 57.—*The seasonal prevalence of diphtheria, in Michigan, as indicated by the average number of persons taken sick with this disease in each month, during the eight years, 1897-1904.*

Months.....	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of persons taken sick.....	325	202	180	150	168	166	125	137	216	378	382	340

REPORTED SOURCES OF CONTAGIUM IN DIPHTHERIA.

Table 58 indicates that, in the fourteen years, 1891-1904, but 22 per cent of the reports relative to diphtheria gave a definite source of contagium. Of this number, 75 per cent gave the source as "Traced to a former case," and 10 per cent as "Traced to outside jurisdictions."

In the early days of sanitary science it was customary for many health officials to designate insanitary surroundings, defective drainage, etc., as the source of diphtheria, and in recent years, notwithstanding the widespread knowledge concerning the etiology of diphtheria, a number of health officers continued to report these conditions as the sources of contagium in outbreaks of this disease. Of the 877 cases in Table 58 attributed to "Insanitary surroundings," etc., 739 cases, or 84

per cent. were reported in the years prior to 1895, and in 1904 not a single report of diphtheria made mention of these sources, from which circumstances we may very properly infer that the educational work of this Department, so far as relates to the methods of communication of diphtheria, has produced very gratifying results.

TABLE 58.—*The reported sources of contagium in diphtheria during the fourteen years, 1891-1904.*

Reported sources of contagium-	Number of instances.
Traced to a former case.....	8,158
Probably traced to a former case*.....	331
Traced to outside jurisdictions.....	1,126
Probably from outside jurisdictions.....	118
Insanitary surroundings, defective drainage, etc.....	877
Infected premises, clothing, books, papers etc.....	113
Contaminated water.....	32
Infected by animals.....	5
From colds following measles.....	5
Attending funerals of diphtheria decedents.....	2
Cases attributed to meteorological conditions.....	62
Total number of cases in which some source was reported.....	10,829
Number of cases in which the source was not stated, or reported as unknown†.....	38,428
Grand total.....	49,257

*Includes, principally, cases reported as traced to "sore throat," "croup," "tonsillitis," etc.

†In each year, many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreaks first began.

THE INFLUENCE OF AGE AND SEX IN DIPHTHERIA.

Table 59 shows that in the 11 years, 1893-1903, nearly 43 per cent of all those who died of diphtheria were under five years of age, 77 per cent under ten years, and over 90 per cent under fifteen years.

Up to the fifth year, diphtheria was most fatal among the males, and at five years and upwards most fatal among the females.

Table 60 indicates that the greatest number of those who recovered from diphtheria were between the ages of four and ten years.

Up to the fifth year, the chances for recovery seem to have been slightly in favor of the males, and at all other ages in favor of the females.

TABLE 59.—*The influence of age and sex in diphtheria, as indicated by the numbers of those who died from this disease in the eleven years, 1893-1903. Arranged by sex, in age periods of five years each.*

Age periods.	Numbers.			Average deaths per year.			Per cent of all deaths of known ages.		
	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,
Under 5 years.....	1,223	1,111	2,334	111	101	212	22.42	20.36	42.78
5-9 years.....	884	981	1,865	80	89	170	16.20	17.98	34.18
10-14 years.....	314	421	735	29	38	67	5.75	7.72	13.47
15-19 years.....	113	133	246	10	12	22	2.07	2.44	4.51
20-24 years.....	42	58	100	4	5	9	.77	1.06	1.83
25-29 years.....	16	49	65	1	4	6	.29	.90	1.19
30-34 years.....	10	30	40	.9	3	4	.18	.55	.73
35-39 years.....	8	13	21	.7	1	2	.15	.24	.39
40-44 years.....	5	11	16	.5	1	1	.09	.20	.29
45-49 years.....	7	7	14	.6	.6	1	.13	.13	.26
50 and over.....	8	12	20	.7	1	2	.15	.22	.37
All ages.....	2,630	2,826	5,456	238.4	255.6	496	48.20	51.80	100.00

TABLE 60.—*The influence of age and sex in diphtheria, as indicated by the numbers of those who recovered from this disease in the eleven years 1893-1903. Arranged by sex, in age periods of five years each.*

Age periods	Numbers.			Average recoveries per year.			Per cent of all recoveries of known ages.		
	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,	Males,	Females,	Both sexes,
Under 5 years.....	2,021	1,848	3,869	184	168	352	9.97	9.11	19.08
5-9 years.....	3,322	3,405	6,727	302	310	612	16.39	16.79	33.18
10-14 years.....	1,875	2,358	4,233	170	214	384	9.25	11.63	20.88
15-19 years.....	844	1,118	1,962	77	102	179	4.16	5.51	9.68
20-24 years.....	420	731	1,151	38	66	104	2.07	3.61	5.68
25-29 years.....	277	496	773	25	45	70	1.37	2.45	3.81
30-34 years.....	196	394	590	18	36	54	.97	1.94	2.91
35-39 years.....	128	285	413	12	26	38	.63	1.41	2.04
40-44 years.....	95	173	268	9	16	25	.47	.85	1.32
45-49 years.....	47	85	132	4	8	12	.23	.42	.65
50 and over.....	45	111	156	4	10	14	.22	.55	.77
All ages.....	9,270	11,004	20,274	843	1,001	1,844	45.73	54.27	100.00

THE DURATION OF SICKNESS IN DIPHTHERIA.

Table 61 indicates that, in a majority of instances, the sickness from diphtheria lasts from 6 to 10 days. From 49 to 55 per cent of all the cases terminate, fatally or otherwise, before the eleventh day; from 71 to 75 per cent before the sixteenth day; and from 84 to 86 per cent before the twenty-first day.

TABLE 61.—*The duration of sickness in fatal and non-fatal cases of diphtheria during the eleven years, 1893-1903.*

Duration periods.	Fatal cases.						Non-fatal cases.					
	Numbers.			Per cent of all cases of known duration.			Numbers.			Per cent of all cases of known duration.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 5 days.....	1,413	1,550	2,963	10.9	12.0	22.9	907	1,032	1,939	6.4	7.2	13.6
6-10 days.....	1,927	2,270	4,197	14.9	17.5	32.4	2,272	2,753	5,025	15.9	19.3	35.2
11-15 days.....	1,185	1,425	2,610	9.1	11.0	20.1	1,450	1,746	3,196	10.2	12.2	22.4
16-20 days.....	641	784	1,425	4.9	6.0	10.9	804	1,020	1,824	5.6	7.2	12.8
21-25 days.....	440	526	966	3.4	4.1	7.5	572	675	1,247	4.0	4.7	8.7
26-30 days.....	174	207	381	1.3	1.6	2.9	236	260	496	1.7	1.8	3.5
31-35 days.....	80	83	173	.6	.7	1.3	93	126	219	.7	.9	1.6
36 and over.....	128	134	262	1.0	1.0	2.0	139	174	313	1.0	1.2	2.2
Totals.....	5,988	6,979	12,967	46.1	53.9	100.0	6,473	7,786	14,259	45.5	54.5	100.0

RESTRICTIVE AND PREVENTIVE MEASURES IN DIPHTHERIA.

Table 62 is a continuation of similar tables in preceding reports, but for a single year. Unfortunately, in 1904 there were 62 outbreaks in which fatal cases occurred, and in which a number of patients were not treated with antitoxin, consequently the results of the antitoxin treatment in these outbreaks cannot be determined. However, the table makes a very satisfactory showing, as may be seen by a comparison of the fatality rates in the table, and by a study of this table in conjunction with Table 53, on a preceding page.

The *immunizing* properties of antitoxin is strikingly shown by the following: In 1902, in addition to the sick persons treated with antitoxin, there were 495 persons more or less exposed to diphtheria who were treated with antitoxin, and of this number only 16 persons were reported to have contracted the disease. In 1903, 585 exposed persons were so treated and but 12 cases of diphtheria resulted among them. In 1904, 612 exposed persons were treated, and of this number 24 cases of diphtheria were reported. For the three years, 1902-1904, a total of 1,692 exposed persons were treated with antitoxin, and of these but 52, or 3 per cent, were reported to have had the disease, and in many of these the disease was in a very mild form.

The following is a sample of many reports received by this Department relative to the efficacy of antitoxin as a *curative* and as an *immunizing* agent in diphtheria:

"I do not think we would have lost our 9 year old patient if antitoxin had been applied to her in time. Antitoxin certainly showed to be a great preventive in this outbreak."

In this outbreak there were five cases, one of which terminated fatally, and which the health officer believed might have recovered by the timely use of antitoxin. In addition to the five sick persons, seven persons who had been exposed were treated with antitoxin, and of these "two had very mild cases of diphtheria."

TABLE 62.—*The antitoxin treatment of diphtheria in Michigan in 1904.*

	Number of outbreaks.	Number of cases.	Number of deaths.	Deaths per 100 cases.
All outbreaks of diphtheria.....	585	3,510	538	15.3
Outbreaks in which antitoxin was used*.....	224	†548	58	10.6
Outbreaks in which antitoxin was not used.....	299	2,532	342	13.5

*There were also 62 outbreaks in which 138 deaths occurred and in which 430 cases were treated with antitoxin, but as only a portion of the cases in these outbreaks were so treated, and there was nothing in the reports to show how many of the 138 fatal cases were included in the 430 cases treated, the 62 outbreaks are not included in the table.

†These figures represent the number of sick persons treated with antitoxin.

TABLE 63.—*Isolation of sick persons, and disinfection of infected premises, in outbreaks of diphtheria, in Michigan, in 1904.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	131	24.0
Both neglected.....	2	.4
Isolation enforced, disinfection neglected or doubtful.....	113	20.7
Disinfection enforced, isolation neglected or doubtful.....	28	5.2
Isolation and disinfection not mentioned in the reports or statements doubtful.....	271	49.7
All outbreaks.....	545	100

Table 63 shows that in 1904, in but 24 per cent of all the outbreaks were the very important restrictive measures of isolation and disinfection both enforced, and indicates that in about 50 per cent of all the outbreaks neither of these restrictive measures were attempted. In 113 outbreaks the isolation of the patients was enforced, and, as a rule, disinfection attempted, but the amount of the disinfectant used in each

case was not considered sufficient, according to the standards laid down by this Department.

NEGLECT OF RESTRICTIVE MEASURES IN DIPHTHERIA IN 1904.

About July 5, 1904, two sisters left Owosso to visit at a town in the State of New York, and on July 14 one of the sisters died there of diphtheria. After the funeral, the other sister returned to Owosso, and on July 18 was taken sick with diphtheria. On July 22, a third sister was taken with the disease.

Had the health authorities of the town where the death occurred, placed the other sister (who had undoubtedly been exposed to the disease) under quarantine and surveillance for even two or three days, the third case, and possibly others with whom the second case travelled from New York to Owosso, would have been prevented.

A somewhat similar case is recorded below under the title, "Diphtheria spread from a case of so-called tonsillitis," in which the wife and mother of two persons who died of diphtheria in Missouri, herself suffering from a "sore throat," was allowed to accompany the remains of her child to Michigan, and by so doing endangered the lives of several others in this State, and possibly in other states, en route. The mere fact that she had been exposed to the two cases should have been sufficient to warrant the health authorities in Missouri in detaining her for at least a brief period, during which time observation and a very simple investigation would have revealed the presence of the "sore throat" from which she suffered, and which was partially, if not wholly, responsible for the outbreak in Michigan.

DIPHTHERIA SPREAD FROM A CASE OF SO-CALLED TONSILLITIS.

On January 18, 1904, Mr. L. A. G. was taken sick at Edgerton, Missouri, with what was pronounced by the attending physician to be simple sore throat. The patient showing no signs of improvement, another doctor was called in and made a diagnosis of severe tonsillitis, and talked of lancing the throat. Diphtheria was not mentioned, nor was antitoxin used.

On January 25, Mr. L. A. G. died, and the body was forwarded, by rail, to Muskegon, Mich., for interment, the body being shipped in an unsealed coffin, labelled "Tonsillitis."

On January 23, the little daughter of Mr. L. A. G. was taken sick and the next day the last physician who attended Mr. L. A. G. was called but made no diagnosis. On January 27, another physician was called in and pronounced the disease diphtheria of a very virulent type. Antitoxin was administered, probably too late to be of use, and the child died on January 29. This body also was shipped to Muskegon, but in a sealed casket and labelled "Diphtheria."

On arrival at Muskegon, these two bodies were taken directly to the receiving vault at the cemetery. Later they were both buried on the same date.

The wife and mother of the deceased persons also suffered with a sore throat, but of so mild a type as not to necessitate the attendance of a physician, and upon her arrival in Muskegon went to reside with the C. family.

On February 20, a son in the C. family was taken sick with diphtheria and died on February 25.

Two other cases were traced by the health officer of Muskegon to this source, and three other cases in the same outbreak were probably of the same origin.

VIOLATION OF PUBLIC HEALTH LAWS.

The following are examples of how diphtheria may be spread through a violation of the laws governing the dangerous communicable diseases:

In April, 1904, a man secretly left the premises in Battle Creek where he had been quarantined, and, without previous disinfection, visited a house in the township of Assyria, Barry County. The sixth day after his arrival, two members of the family where he visited were taken sick with diphtheria, and subsequently another person, making three cases in all. So far as can be learned, no prosecution followed this wilful violation of the law and jeopardizing of human life.

One health officer reports that "The patient's parents brought a quilt from Vermontville, from a house infected with diphtheria and scarlet fever, and used it on the patient's bed."

VITALITY OF THE DIPHTHERIA BACILLI.

In former annual reports of this Department, many instances of exceptional vitality of the diphtheria germ have been given. As such cases are of considerable interest to the student of hygiene, and are a powerful argument for thorough disinfection in cases of diphtheria, a few such instances which occurred in 1904, and given in the words of the health officers who made the reports, may prove interesting and instructive. The statements are replies to the question asked by this Department relative to the source of the contagium:

- "Cleaning house where diphtheria had been two years ago."
- "Had diphtheria one year ago."
- "Case of diphtheria in house in 1903."
- "Diphtheria existed in house about two years ago."
- "Patient had diphtheria twice before."*
- "There was diphtheria in the same place last winter."
- "Had it last year." *

A health officer in Mecosta County reported that twenty years ago Mrs. T. lost a daughter by death from diphtheria, and then some of the girl's clothing was put away in a chest and nailed up. The chest was not disturbed until the spring of 1904, when the mother, seventy-five years of age, opened it and looked over the clothing, soon after which she was taken sick with diphtheria and died, June 17, 1904. The health officer believes she contracted the disease from the clothing, infected twenty years ago.

*The connection between the first, second and third attacks in one person, and the first and second attacks in another person, was not stated. It is believed, however, that the recurrence of the disease was due to the continued presence of the diphtheria bacilli in the houses or belongings of these persons.

MORTALITY FROM DIPHTHERIA AND CROUP IN MICHIGAN FOR FIVE YEARS, 1900-04.*

The deaths given in the tables† on pages 74 and 75 as having occurred in Michigan from diphtheria and croup are not to be understood as being due to two separate diseases. The cause of death in these cases is really nothing more or less than diphtheria, the term "croup," in its usual employment, being a relic of a past pathology and used either from ignorance or design to conceal the true nature of the disease. By adding all deaths from the alleged two causes, we approximate only to the true mortality from diphtheria. This is the usual practice among sanitarians and statisticians at present. There are other deaths really due to this disease, some of them being returned from "tonsillitis," "quinsy," "heart failure," etc., etc., which it is impossible to compile where they belong owing to the failure of the attending physician to make a proper report. Thus a death from "laryngeal and pharyngeal paralysis" in a child of 13 years returned from a city where diphtheria has been prevalent is strongly suggestive of diphtheria as a cause, but evidently cannot be so compiled. As with other diseases, we deal with a minimum, but the figures as they stand are sufficiently high to deserve careful study on the part of our sanitary authorities and the public generally.

The total number of deaths in Michigan during the past five years from diphtheria and croup according to the statistics on page 74 was 2,734, somewhat less than the number of deaths from typhoid fever for the same time, as given in the last BULLETIN (3,312), although the general uniform distribution of the mortality throughout the various sections of the State was not very dissimilar. The age distribution of diphtheria and typhoid deaths is quite different, the great majority of the former being those of children and young persons under the age of fifteen, while typhoid mortality is at its maximum from fifteen to thirty. Typhoid fever robs of life in the height of present usefulness and productiveness; diphtheria steals its victims from the coming generation, and before their economic value has fully developed. In considering the death rates of the different sections, counties and cities shown in the accompanying tables, the wide differences in the age distribution of population should be borne in mind. In counties having few children in proportion to the total population, the actual incidence of diphtheria to susceptible population would be somewhat greater, and in counties having a large proportion at the susceptible ages, it would be relatively somewhat less than the comparative ratios shown in the tables. Nevertheless, general comparisons may safely be made, and especially in the same sections of the State where the various contributory factors of mortality may be taken as nearly identical. It should be remembered that rates based on very few deaths or sparsely settled populations or from counties having very imperfect returns, as indicated by the table given on page 51 of the July BULLETIN, may be liable to considerable error.

COMPARATIVE MORTALITY FROM DIPHTHERIA AND CROUP.

For the census year 1900 the death rate in Michigan was lower than in any other registration state except Vermont, where the registration of deaths fell below the standard adopted by the census for that year: Connecticut, 35.9; District of Columbia, 75.4; Maine, 24.1; Massachusetts, 45.5; Michigan, 22.3; New Hampshire, 26.0; New Jersey, 48.8; New York, 45.3; Rhode Island, 29.6; Vermont, 18.3. Some foreign rates for the year 1902 from diphtheria and croup are: Norway, 10.8; German Empire, 32.2; Prussia, 40.2; Hungary, 46.1; Belgium, 26.3; Switzerland, 21.6; Spain, 28.0; and Italy, 13.7. Diphtheria alone gave the following: England and Wales, 23.6; Scotland, 14.6; Ireland, 9.5; New South Wales, 5.3; Victoria, 8.6; New Zealand, 6.8. Groups of American cities, according to the U. S. Census Bureau, gave for the eleven-year period 1890-1900 the following average rates from diphtheria and croup: Cities in New England states,

*Reprinted from the Michigan Monthly Bulletin of Vital Statistics for September, 1905.

†Omitted on account of their being too large for the pages of this report.

77; cities in Middle states, 101; cities in Lake states, 79; cities in Southern states, 54; cities in Western Central states, 61; San Francisco, Cal., 51. The mortality was greatly reduced during the period, so that the present average rate would be much less.

DIPHTHERIA AND CROUP IN MICHIGAN BY COUNTIES.

The maximum death rate from diphtheria and croup was in the Upper Peninsula, and the county with the highest rate for the five-year period was Gogebic, 68.2, Marquette, 43.3, Schoolcraft, 41.2, and Chippewa, 37.7, were also high for the term, while two counties of small population, Keweenaw and Luce, reported no deaths from this cause.

The highest rate in the Northern counties was for Roscommon, 56.9, a rate dependent upon the very small population of the county and a few deaths in the past two years. The rate for Alpena county was 54.7 and is more significant of the continued high prevalence of this disease. One small county in this section, Crawford, also had no deaths during the five years from diphtheria.

A more uniform occurrence of deaths from diphtheria, as shown by the average mortality, appears in the Central counties, the highest rate being 33.1 for Bay and the lowest rates being for the counties of Gratiot, 4.6, and Newaygo, 8.9.

In the Southern counties, the maximum mortality from diphtheria and croup for the five-year period occurred in Wayne county, 42.3, and in Calhoun county, 30.9, the lowest rates for the section being in Barry county, 4.5, Allegan county, 5.7, St. Joseph county, 5.9, and Hillsdale county, 6.7.

DIPHTHERIA AND CROUP IN MICHIGAN BY CITIES.

The high death rates from diphtheria and croup in certain counties as shown on page 74 are due to the rates for certain cities contained in them, as may be seen by the table showing deaths and death rates by cities on page 75. It appears that the average urban mortality from this disease was 29.8 or nearly twice the rate of the rural districts, 16.9. In the registration states it was more than twice as high both in 1900 and in 1890. It is a disease preeminently spread by contact with infected individuals.

The average death rate from diphtheria and croup in Detroit, 42.2, is more than twice as great as that of Grand Rapids, 19.4, directly opposite to the incidence of typhoid fever in the two cities. Recent years have apparently shown increased prevalence in Detroit, the highest rate being 72.7 in 1903. Bay City had the highest rate in the group following, 35.5 for the period, and the maximum was in 1900 with 72.4. West Bay City, now consolidated with Bay City, has a slightly higher average rate than the latter. Jackson has the lowest average rate, 11.9, of any city over 25,000 population, but Kalamazoo is a close second with a rate of 14.0.

Among cities of 10,000 to 25,000 population, the highest rate, as well as the highest rate for any city in the State, occurs in the city of Ironwood. The rate was 89.2 per 100,000 for the five-year period, the greatest prevalence being in 1903, 150.9, and 1902, 131.8. Next to Ironwood in this group come Ishpeming, 65.9, and Sault Ste. Marie, 58.2, while Traverse City, 9.7, Ann Arbor, 12.4, and Muskegon, 13.4, showed the lowest average rates.

Cities of from 5,000 to 10,000 population show lower rates than those of larger size as a rule, but the average rate for Wyandotte, 67.9, is second highest in the State. The greatest mortality for this city was in 1903, 167.8, which exceeded that of any other city. Rates for tuberculosis and typhoid fever in Wyandotte are also very high, as may be noted in the tables accompanying previous issues of the BULLETIN, and special attention should be directed to the apparently unrestricted prevalence of such infectious diseases. Next to Wyandotte in this group the highest rate occurs in Negaunee, 49.5, and the lowest rates are in Holland, 7.2, Ionia, 7.7, and Grand Haven, 8.0.

Local sanitary officials should be able, by the aid of these tables, to see how the mortality from diphtheria in their districts compares with that of cities of similar size and with that of the State generally. It would seem that there has not been that continuous and progressive diminution of the disease that should result from prompt reports of its occurrence to the sanitary officials

and the general and thorough use of antitoxin, now accepted as the specific curative agent in the treatment of the affection. It is possible that sanitary measures may have counteracted one of the natural increases in prevalence indicated by the increase in 1900, and that the comparatively slight incidence of the disease since that date may represent a real triumph of sanitation. Even, if this be so, there is no reason why efforts should not be made for its complete extermination, and it is to be hoped that the next quinquennial comparison will show much less than five hundred lives sacrificed each year in Michigan to this entirely preventable disease.

WHOOPING-COUGH IN MICHIGAN IN 1904 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year ending December 31, 1904, there were reported to the State Department of Health 188 outbreaks of whooping-cough in 161 localities in Michigan, which resulted in 1,779 cases, including 141 deaths.

Table 64 shows that in 1904, compared with the preceding year, there were 2,393 cases and 220 deaths less, and the death rate was 8.8 per 100,000 less.

In 1904, compared with the average for the years 1886-1903, the number of cases was nearly 50 per cent less, the deaths 10 per cent less, and the death rate per 100,000 inhabitants slightly less. The fatality (deaths per 100 cases) was considerably greater than the average, both in 1904 and in the two preceding years.

In studying the rates for whooping-cough, as for all other diseases in this State, in recent years, the fact should be borne in mind that prior to 1898, not all the deaths were reported, and that while the deaths from whooping-cough are now fully reported, a large number of cases are not reported, making the fatality in recent years apparently much too high.

Table 65 gives the death rates for whooping-cough, as compiled by the Secretary of State, prior to the commencement of the compilation of this disease by the State Health Department. Comparing the death rates prior to 1886 with those since that time, it will be seen that, as a rule, the former are much greater, due to the different methods in use in the two departments in the classification of deaths from whooping-cough when complicated with or followed by other diseases induced by it.

GEOGRAPHICAL DISTRIBUTION OF WHOOPING-COUGH.

Table 66 indicates that in 1904, compared with the average death rate from whooping-cough for the entire State for the years 1898-1904 (8.8 per 100,000), this disease was much more prevalent than this average in the Upper Peninsular Division, and somewhat more prevalent than this average in the Northern Division.

The counties in which whooping-cough was unusually prevalent during the seven years, 1898-1904, placed in the order of apparent greatest prevalence, are: Alger, Houghton, Arenac, Delta, Menominee, Roscommon, Cheboygan, Marquette, Bay, Otsego, Alpena, Midland, Antrim, Baraga, Macomb, Schoolcraft, Montcalm, Sanilac, and Dickinson.

TABLE 64.—*The general prevalence of whooping-cough in Michigan during the nineteen years, 1886-1904.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.*	Reported deaths.	Deaths per 100 cases.†	Deaths per 100,000 of the population.
1886.....	1,933,735	2,642	62	2.3	3.2
1887.....	1,973,774	2,267	59	2.6	3.0
1888.....	2,013,812	2,502	49	2.0	2.4
1889.....	2,053,851	2,694	41	1.5	2.0
1890.....	2,093,889	983	20	2.0	1.0
1891.....	2,130,827	2,360	101	4.3	4.7
1892.....	2,167,765	3,188	77	2.4	3.6
1893.....	2,204,703	4,047	134	3.3	6.1
1894.....	2,241,641	4,555	123	2.7	5.5
1895.....	2,271,531	4,284	109	2.5	4.5
1896.....	2,301,421	5,466	91	1.7	4.0
1897.....	2,331,311	3,978	72	1.8	3.1
1898.....	2,361,201	5,300	267	5.0	11.3
1899.....	2,391,091	6,509	216	3.3	9.0
1900.....	2,420,982	3,397	177	5.2	7.3
1901.....	2,450,872	2,955	118	4.0	4.8
1902.....	2,475,499	3,534	222	6.3	8.9
1903.....	2,502,758	4,172	361	8.7	14.4
1904.....	2,530,016	1,779	141	7.9	5.6
Averages per year.....	2,255,299	3,506	128	3.7	5.7

*From Detroit, Bay City, Jackson and Alpena, and probably other localities, only the fatal cases were reported during many of the years.

†For the reason that, in many instances, only the fatal cases were reported, the fatality rates are probably inaccurate.

TABLE 65.—*The numbers of deaths from whooping-cough per 100,000 persons living in Michigan, in each of the seventeen years, 1869-1885. Compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	13.9	10.1	5.5	15.1	15.6	11.2	7.2	12.4	8.7	8.5	10.2
Years.....	1880	1881.	1882.	1883.	1884.	1885.					
Deaths.....	16.1	8.4	5.0	5.2	8.8	7.4					

TABLE 66.—*The geographical distribution of whooping-cough in Michigan in the seven years, 1898-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical division.	Average			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.				
Alger county.....	259,693	822.6	41.9	16.1
Baraga county.....	5,901	9	2	33.9
Chippewa county.....	4,959	.6	.6	12.1
Delta county.....	20,962	144	2	9.5
Dickinson county.....	24,951	102	5	20.0
Gogebic county.....	17,592	25	2	11.4
Houghton county.....	16,474	37	1	6.1
Iron county.....	64,263	204	14	21.8
Keweenaw county.....	8,702	12	.9	10.3
Luce county.....	3,502	3	0	.....
Mackinac county.....	3,088	5	.3	9.4
Marquette county.....	7,574	8	.4	5.3
Menominee county.....	40,497	135	7	17.3
Ontonagon county.....	26,281	49	5	19.0
Schoolcraft county.....	6,591	10	.7	10.6
	8,356	79	1	11.9
NORTHWESTERN DIVISION.				
Benzie county.....	88,797	107	7	7.9
Grand Traverse county.....	10,525	6	.4	3.8
Leelanau county.....	21,942	42	2	9.1
Manistee county.....	10,827	4	1	9.2
Wexford county.....	27,720	43	3	10.8
	17,783	12	.6	3.4
NORTHERN DIVISION.				
Antrim county.....	78,595	154	8.9	11.3
Charlevoix county.....	15,706	42	2	12.7
Cheboygan county.....	14,391	9	1	7.0
Crawford county.....	16,291	21	3	18.4
Emmet county.....	3,112	6	.3	9.6
Kalkaska county.....	15,737	40	1	6.4
Otsego county.....	7,030	13	.6	8.5
	6,328	23	1	15.8
NORTHEASTERN DIVISION.				
Alcona county.....	56,827	106	5.5	9.7
Alpena county.....	5,613	2	.1	1.8
Iosco county.....	19,321	27	3	15.5
Montmorency county.....	10,022	13	1	10.0
Ogemaw county.....	3,413	15	.1	2.9
Oscoda county.....	7,659	44	.7	9.1
Presque Isle county.....	1,683	3	0	.....
	9,116	2	.6	6.6
WESTERN DIVISION.				
Kent county.....	272,400	200	10.7	6.1
Lake county.....	134,488	156	7	5.2
Mason county.....	5,045	8	0	.....
Muskegon county.....	19,666	31	2	10.2
Newaygo county.....	36,374	23	3	8.2
Oceana county.....	17,921	14	1	5.6
Ottawa county.....	17,304	30	.7	4.1
	41,602	28	3	7.2
NORTHERN CENTRAL DIVISION.				
Clare county.....	104,827	253	8.6	8.2
Gladwin county.....	8,681	24	.4	4.6
Isabella county.....	7,039	15	.4	5.7
Mecosta county.....	23,725	36	2	8.4
Midland county.....	20,865	43	2	9.6
Muskegon county.....	14,984	86	2	13.4
Osecola county.....	9,591	13	.6	6.3
Roscommon county.....	18,333	29	.9	5.0
	1,609	7	.3	18.6

*This footnote is below Table 64, on a preceding page.

TABLE 66.—Concluded.

Geographical division.	Average.			
	Population.	Cases.*	Deaths.	Death
				rates.
BAY AND EASTERN DIVISION.	345,646	471	35	10.3
Arenac county.....	9,533	12	2	21.0
Bay county.....	64,026	73	11	17.2
Huron county.....	35,090	94	3	8.5
Lapeer county.....	27,676	53	2	7.2
Saginaw county.....	82,853	56	6	7.2
Sanilac county.....	35,107	78	4	11.4
St. Clair county.....	55,256	51	4	7.2
Tuscola county.....	36,105	49	3	8.3
CENTRAL DIVISION	316,158	754	22.9	7.2
Barry county.....	22,651	109	2	8.8
Clinton county.....	25,404	38	2	7.9
Eaton county.....	31,764	206	2	6.3
Genesee county.....	42,147	34	3	7.1
Gratiot county.....	29,837	23	3	10.1
Ingham county.....	41,785	58	2	4.8
Ionia county.....	35,225	110	2	5.7
Livingston county.....	19,387	65	.9	4.6
Montcalm county.....	33,825	58	4	11.8
Shiawassee county.....	34,133	53	2	5.9
SOUTHWESTERN DIVISION.	142,820	217	11	7.7
Allegan county.....	39,042	42	2	5.1
Berrien county.....	49,635	76	5	10.1
Cass county.....	20,731	40	1	4.8
Van Buren county.....	33,412	59	3	9.0
SOUTHERN CENTRAL DIVISION.	321,456	517	17.9	5.6
Branch county.....	26,660	44	2	7.5
Cahoun county.....	51,368	104	4	7.8
Hillsdale county.....	29,847	70	.9	3.0
Jackson county.....	47,831	110	4	8.4
Kalamazoo.....	46,503	51	3	6.5
Lenawee county.....	48,721	57	2	4.1
St. Joseph county.....	23,909	31	1	4.2
Washtenaw county.....	46,612	50	1	2.1
SOUTHEASTERN DIVISION	468,969	257	42	9.0
Macomb county.....	33,131	51	4	12.1
Monroe county.....	33,207	66	3	9.0
Oakland county.....	44,988	38	2	4.4
Wayne county.....	357,643	102	33	9.2

*This footnote is below Table 64, on a preceding page.

THE SEASONAL PREVALENCE OF WHOOPING-COUGH.

Table 67 indicates that whooping-cough is most prevalent in January, and least prevalent in September. The prevalence is quite uniform, and varies but little in the different months.

TABLE 67.—The seasonal prevalence of whooping-cough, as indicated by the average numbers of persons taken sick with this disease, in each month during the three years, 1902-1904.

Months.....	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average numbers of persons taken sick.....	183	137	140	130	129	156	140	122	86	110	132	149

THE REPORTED SOURCES OF CONTAGIUM IN WHOOPING-COUGH.

By Table 68 it may be seen that of the total number of reports of whooping-cough to the State Health Department, during the nine years, 1896-1904, but 20 per cent gave a definite source of contagium.

Of the cases in which a definite source of contagium was reported, 75 per cent were traced to a former case, and 23 per cent were traced to outside jurisdictions.

TABLE 68.—*The reported sources of contagium in whooping-cough in Michigan in the nine years, 1896-1904.*

Reported sources, etc.	Number of cases.
Traced to a former case*.....	5,510
Traced to outside jurisdictions.....	1,650
Probably from outside jurisdictions.....	62
Contracted in school.....	81
Total number of cases in which the source was reported.....	7,303
Source reported as unknown, or not definitely stated.....	19,986
Source not mentioned†.....	9,801
Total number of cases reported in the nine years.....	37,090

*Many other cases which were traced to former cases are included with the cases reported as traced to outside jurisdictions.

†In each year, many cases in this group belonged to outbreaks which began in the preceding year, and the source of contagium may have been traced and reported when the outbreaks first began.

PERIODS OF INCUBATION IN WHOOPING-COUGH.

Table 69 is a summary of similar tables in preceding reports. By reason of the difficulty experienced, by health officers, in ascertaining the time of exposure to and the first symptoms of whooping-cough, the period of incubation is not easy to determine with any degree of accuracy. It is believed, however, that the figures shown in the table, though but a small fraction of the cases which occurred in the seven years, are fairly representative of the whole number. The period of incubation seems to be 14 days, with a range of from 7 to 14 days.

TABLE 69.—*Reported periods of incubation in whooping-cough, seven years, 1897–1903.*

Incubation period—days.....	3	4	5	6	7	8	9	10	11	12	13
Number of instances in each day*.....	1	1	1	1	17	7	27	43	4	5	1
Incubation period—days.....	14	15	16	18	20	21	28	30			
Number of instances in each day*.....	53	2	1	1	3	9	3	2			

*In many of these instances it was reported as *about* the number of days stated.

THE INFLUENCE OF AGE IN WHOOPING-COUGH.

Table 70 indicates that of all the persons sick from whooping-cough, whose age was given, the greatest number were under one year of age; about 56 per cent under 5 years, and 87 per cent under 9 years.

Of those who died from whooping-cough, 62 per cent were under one year of age, and 96 per cent under 5 years.

Table 70 also indicates that practically all the cases of whooping-cough are persons not over twenty years of age, and that, as a rule, the fatality of the disease decreases rapidly with each increase of age.

TABLE 70.—*The influence of age in whooping-cough as indicated by the numbers of cases in certain age-groups, 1896–1903.*

Age periods.	All cases.			Fatal cases.		
	Total number of cases of known ages.	Per cent of all cases of known ages.	Averages per year.	Total number of deaths of known ages.	Per cent of all deaths of known ages.	Averages per year.
0-1 year.....	1,185	17.1	148	833	61.6	104
1-2 years.....	784	11.3	98	291	21.5	36
2-3 years.....	617	8.9	76	82	6.1	10
3-4 years.....	664	9.6	83	56	4.1	7
4-5 years.....	605	8.7	77	31	2.3	4
Under 5 years.....	3,255	55.5	422	1,293	95.6	162
5-9 years.....	2,205	31.7	276	51	3.8	6
10-14 years.....	630	9.1	79	2	.1	.3
15-19 years.....	137	2.0	17	4	.3	.5
20-24 years.....	39	.6	5	2	.1	.3
25-29 years.....	21	.3	3	0	0	0
30-34 years.....	21	.3	3	0	0	0
35-39 years.....	11	.2	1	0	0	0
40-44 years.....	8	.1	1	1	.07	.1
45-49 years.....	6	.09	.8	0	0	0
50 years and over.....	15	.2	2	0	0	0
Totals.....	6,948	100.00	\$69.8	1,353	100.00	169.2

RESTRICTIVE AND PREVENTIVE MEASURES IN WHOOPING-COUGH.

Table 71 indicates that in but 10 per cent of the outbreaks of whooping-cough in 1904 was there any attempt to restrict the disease, and that in less than 2 per cent of the outbreaks were the restrictive measures properly carried out. In the 8 per cent of outbreaks in which isolation was enforced and disinfection neglected or doubtful, the principal trouble lay in the fact that, in these outbreaks, the health officers did not use a sufficient amount of the disinfectant.

TABLE 71.—*Isolation of sick persons, and disinfection of infected premises, in outbreaks of whooping-cough, in Michigan, in 1904.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	3	1.7
Both neglected.....	11	6.4
Isolation enforced, disinfection neglected or doubtful.....	14	8.1
Disinfection enforced, isolation neglected or doubtful.....	1	.6
Isolation and disinfection not mentioned, or statements doubtful.....	144	83.2
All outbreaks*.....	173	100.0

*There were fifteen outbreaks which began in a preceding year, or were continued into 1905, which cannot be included in this table because the extent of the restrictive measures is not definitely known.

SCARLET FEVER IN MICHIGAN IN 1904 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1904, there were reported to the State Department of Health 838 outbreaks of scarlet fever, in 626 localities, which resulted in 4,088 cases, including 228 deaths.

In 1904, compared with the preceding year, there were 1,263 cases less, and 16 more deaths.

In 1904, compared with the average for twenty-one years, shown in Table 72, the numbers of cases and deaths and the death-rate per 100,000 of the population were slightly less, but the fatality (deaths per 100 cases) was slightly greater.

A comparison of the death rates in Tables 72 and 73 shows that, from 1870 to 1883, inclusive, the death rates from scarlet fever were much higher than in any year since that time, the highest rates being in the years prior to the establishment of the State Board of Health.

TABLE 72.—*The general prevalence of scarlet fever in Michigan during the twenty-one years, 1884-1904.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1884.....	1,853,658	2,476	230	9.3	12.4
1885.....	1,893,697	2,750	187	6.8	9.9
1886.....	1,933,735	3,046	275	9.0	14.2
1887.....	1,973,774	3,400	314	9.2	15.9
1888.....	2,013,812	2,989	200	6.7	9.9
1889.....	2,053,851	3,535	166	4.7	8.1
1890.....	2,093,889	3,835	162	4.2	7.7
1891.....	2,130,827	6,212	286	4.6	13.4
1892.....	2,167,765	7,075	487	6.9	22.5
1893.....	2,204,703	6,065	415	6.8	18.8
1894.....	2,241,641	5,500	203	3.7	9.1
1895.....	2,271,531	3,903	125	3.2	5.5
1896.....	2,301,421	2,646	81	3.1	3.5
1897.....	2,331,311	2,482	115	4.6	4.9
1898.....	2,361,201	2,409	100	4.2	4.2
1899.....	2,391,091	4,345	171	3.9	7.2
1900.....	2,420,982	6,734	306	4.5	12.6
1901.....	2,450,872	7,726	298	3.9	12.2
1902.....	2,475,499	6,582	248	3.8	10.0*
1903.....	2,502,758	5,353	212	4.0	8.5
1904.....	2,530,016	4,088	228	5.6	9.0
Averages per year.....	2,218,954	4,436	229	5.2	10.3

TABLE 73.—*The numbers of deaths from scarlet fever per 100,000 persons living, in Michigan, in each of the fifteen years, 1869-1883, compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879
Deaths.....	22.1	72.0	56.6	44.3	43.9	32.2	30.0	27.4	26.9	27.7	26.3
Years.....	1880.	1881.	1882.	1883.							
Deaths.....	22.7	22.8	34.3	37.9							

GEOGRAPHICAL DISTRIBUTION OF SCARLET FEVER.

Table 74 indicates that, compared with the average for the entire State for the thirteen years, 1892-1904, (9.8 deaths per 100,000 inhabitants), scarlet fever was much more prevalent than the average, in the Upper Peninsula and Southeastern divisions. It was slightly more prevalent than the average, in the Northwestern, Northern, and Northeastern divisions.

The counties in which scarlet fever was unusually prevalent, in the thirteen years, 1892-1904, placed in the order of greatest death rates are:

Lake county.....	with a death rate of 36.5 per 100,000
Otsego county.....	" " " " 35.3 " 100,000
Houghton county.....	" " " " 34.3 " 100,000
Oscoda county.....	" " " " 34.1 " 100,000
Gogebic county.....	" " " " 31.9 " 100,000
Keweenaw county.....	" " " " 31.8 " 100,000
Mackinac county.....	" " " " 26.7 " 100,000
Chippewa county.....	" " " " 21.6 " 100,000
Wexford county.....	" " " " 18.5 " 100,000
Macomb county.....	" " " " 18.3 " 100,000
Crawford county.....	" " " " 17.0 " 100,000
Wayne county.....	" " " " 16.1 " 100,000
Alpena county.....	" " " " 16.0 " 100,000
Marquette county.....	" " " " 15.1 " 100,000
Gladwin county.....	" " " " 14.7 " 100,000
Antrim county.....	" " " " 14.0 " 100,000
Cheboygan county.....	" " " " 13.1 " 100,000
Schoolcraft county.....	" " " " 12.7 " 100,000
Dickinson county.....	" " " " 12.1 " 100,000

TABLE 74.—*The geographical distribution of scarlet fever, in Michigan, in the thirteen years, 1892-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical divisions.	Average.			
	Population.	Cases.	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	237,738	649	45.2	19.0
Alger county.....	4,529	6	.2	4.4
Baraga county.....	4,066	3	0	0.0
Chippewa county.....	18,526	39	4	21.6
Delta county.....	22,532	44	2	8.9
Dickinson county.....	16,516	35	2	12.1
Gogebic county.....	15,668	46	5	31.9
Houghton county.....	55,357	208	19	34.3
Iron county.....	7,352	7	.4	5.4
Keweenaw county.....	3,144	6	1	31.8
Lucas county.....	2,782	2	.2	7.2
Mackinac county.....	7,483	16	2	26.7
Marquette county.....	39,779	176	6	15.1
Menominee county.....	25,140*	34	2	8.0
Ontonagon county.....	6,388	9	.4	6.3
Schoolcraft county.....	7,590	18	1	12.7
NORTHWESTERN DIVISION.	83,177	201	8.4	10.1
Benzine county.....	9,490	37	1	10.5
Grand Traverse county.....	20,054	56	2	10.0
Leelanau county.....	10,258	6	.4	3.9
Manistee county.....	27,195	58	2	7.4
Wexford county.....	16,180	44	3	18.5
NORTHERN DIVISION.	71,062	172	9	12.7
Antrim county.....	14,311	25	2	14.0
Charlevoix county.....	12,934	37	1	7.7
Cheboygan county.....	15,308	35	2	13.1
Crawford county.....	2,949	10	.5	17.0
Emmet county.....	13,462	32	1	7.4
Kalkaska county.....	6,432	19	.5	7.8
Otsego county.....	5,066	14	2	35.3
NORTHEASTERN DIVISION.	54,681	106	6.3	11.5
Alema county.....	5,558	11	.4	7.2
Alpena county.....	18,726	35	3	16.0
Iosco county.....	11,165	17	.9	8.1
Montmorency county.....	3,004	10	.3	10.0
Ogemaw county.....	6,784	25	.7	10.3
Oscoda county.....	1,760	4	.6	34.1
Presque Isle county.....	7,684	4	.4	5.2
WESTERN DIVISION.	267,305	524	18.6	7.0
Kent county.....	129,490	306	9	7.0
Lake county.....	5,477	24	2	36.5
Mason county.....	19,228	24	2	10.4
Muskegon county.....	36,968	67	2	5.4
Newaygo county.....	18,540	22	.8	4.3
Oceana county.....	17,057	27	.8	4.7
Ottawa county.....	40,545	54	2	4.9
NORTHERN CENTRAL DIVISION.	100,207	176.4	7.75	7.8
Clare county.....	8,415	8	.5	5.9
Gladwin county.....	6,112	12	.9	14.7
Isabella county.....	22,823	42	.6	2.6
Mecosta county.....	20,910	38	2	9.6
Midland county.....	14,276	26	.7	4.9
Missaukee county.....	8,465	16	1	11.8
Osceola county.....	17,573	34	2	11.4
Rosecommon county.....	1,633	.4	.08	4.9

TABLE 74.—*Concluded.*

Geographical division.	Average.			
	Population.	Cases.	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	341,639	640	27.8	8.1
Arenac county.....	8,404	16	.8	9.5
Bay county.....	63,190	134	6	9.5
Huron county.....	33,983	44	3	8.8
Lapeer county.....	28,210	69	2	7.1
Saginaw county.....	82,737	117	5	6.0
Sanilac county.....	34,693	42	2	5.8
St. Clair county.....	54,958	144	6	10.9
Tuscola county.....	35,464	74	3	8.5
CENTRAL DIVISION.	315,409	685	17.5	5.5
Barry county.....	23,109	26	.9	3.9
Clinton county.....	25,771	64	2	7.8
Eaton county.....	32,182	67	2	6.2
Genesee county.....	41,436	131	3	7.2
Gratiot county.....	29,453	43	1	3.4
Ingham county.....	40,918	85	2	4.9
Ionia county.....	35,060	92	2	5.7
Livingston county.....	19,842	38	.6	3.0
Montcalm county.....	34,000	70	2	5.9
Shiawassee county.....	33,638	69	2	5.9
SOUTHWESTERN DIVISION.	140,329	253	9	6.4
Allegan county.....	39,131	58	1	2.6
Berrien county.....	47,941	85	4	8.3
Cass county.....	20,925	38	1	4.8
Van Buren county.....	32,332	72	3	9.3
SOUTHERN CENTRAL DIVISION.	316,318	663	15	4.7
Branch county.....	26,422	44	1	3.8
Calhoun county.....	49,724	74	1	2.0
Hillsdale county.....	30,004	53	1	3.3
Jackson county.....	47,307	97	2	4.2
Kalamazoo county.....	44,582	140	3	6.7
Lenawee county.....	48,642	117	3	6.2
St. Joseph county.....	24,428	54	1	4.1
Washtenaw county.....	49,209	84	3	6.6
SOUTHEASTERN DIVISION.	439,572	922	62	14.1
Macomb county.....	32,801	86	6	18.3
Monroe county.....	33,191	52	1	3.0
Oakland county.....	43,944	75	2	4.6
Wayne county.....	329,636	709	53	16.1

THE PREVALENCE OF SCARLET FEVER IN URBAN AND RURAL LOCALITIES.

Table 75 shows that, of the localities infected with scarlet fever in 1904, the greatest proportion were urban, but, judging by the numbers of cases and deaths per 100,000 of the population, the disease was slightly more prevalent in the rural localities.

The fatality (deaths per 100 cases) was slightly higher in the urban than in the rural localities.

The exceptionally high death rate in the group of urban localities of from 10,000 to 25,000 population, was due to the epidemic of scarlet fever at Calumet, 100 cases and 21 deaths having been reported from this locality.

TABLE 75.—*The prevalence of scarlet fever in urban and rural localities in Michigan, in 1904.*

Localities,—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.	Deaths.	Death rates per 100,000 of the population.
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	716	44	10.6
Cities from 25,000 to 50,000.....	129,336	4	4	100	160	7	5.4
Cities from 10,000 to 25,000, and Calumet township. (17,150)	266,888	19	16	84	434	35	13.1
Cities and villages from 5,000 to 10,000.....	139,870	21	18	86	165	9	6.4
Cities and villages under 5,000.....	397,332	367	139	38	618	24	6.0
Total urban.....	1,346,735	413	179	43	2,093	119	8.8
Rural (townships*).....	1,183,281	1,217	447	37	1,995	109	9.2

*Not including Calumet, which, for the purposes of this study, is classed with urban localities having corresponding populations.

THE SEASONAL PREVALENCE OF SCARLET FEVER.

Table 76 shows that, in the eight years, 1897-1904, the greatest number of persons taken sick with scarlet fever occurred in December and the least number of cases began in August. The months of greatest prevalence are from October to February, both inclusive.

TABLE 76.—*The seasonal prevalence of scarlet fever, as indicated by the average numbers of persons taken sick in each month in the eight years, 1897-1904.*

Months	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases taken sick.....	504	422	383	343	336	261	225	216	313	406	459	540

THE REPORTED SOURCES OF CONTAGIUM IN SCARLET FEVER.

Table 77 shows that in but 22 per cent of the cases of scarlet fever which occurred in the 13 years, 1892-1904, was the source of the contagium definitely traced.

Of the 14,560 cases in which the source of contagium was reported, 78 per cent were definitely traced to a former case and 13 per cent to outside jurisdictions. This movement of infection was unnecessary, and could and should have been prevented.

For the past twenty-eight years this Department has labored with the people of this State for the restriction and prevention of scarlet fever, and it has been demonstrated, in season and out of season, that proper isolation and disinfection will eradicate this disease, yet we are confronted, year after year, with numerous instances of neglect, and in some cases, an utter disregard for the health and lives of the people.

There are many reasons for this condition, principal among which may be mentioned the difficulties attending the proper isolation of the sick and all exposed and infected persons.

Restrictive measures mean inconvenience to the families of the sick, and, in many instances, considerable expense to the locality, and many health officers are hindered in their work by the selfishness of the people whom they wish to keep within certain bounds, or by the thought, born of experience, that if they do all that is necessary, the bills contracted may be held up by an over zealous board of supervisors, or other auditing board.

Failure on the part of attending physicians to coöperate with the local health officers, and failure on the part of local officers to take advantage of the aid which this Department can give, in outbreaks of disease, are responsible for very many cases, not only of scarlet fever, but of many other preventable diseases.

The recognition of personal responsibility in matters pertaining to the public health will do much toward the eradication of disease. This applies not only to the person who may, in any manner, expose others to disease, but to those who by any act of their own, or by their indifference, may negative the whole or any part of the work of those engaged in the suppression of diseases.

TABLE 77.—*The reported sources of contagium in scarlet fever, in the thirteen years, 1892-1904.*

Sources of contagium.	Number of instances.
Traced to a former case.....	11,444
Probably traced to a former case.....	609
Traced to outside jurisdictions.....	1,909
Probably from outside jurisdictions.....	202
Infected houses, articles, clothing, etc.....	308
Insanitary conditions	60
Immigrants.....	24
Letters from scarlet fever patients.....	4
Number of cases in which a source of contagium was reported.....	14,560
Source reported as unknown.....	30,678
Source not stated, or statements doubtful*.....	19,675
Total number of cases in the 13 years, 1892-1904.....	64,913

*In each year, many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreaks first began.

SCARLET FEVER IN 1904, DUE TO INFECTED PREMISES AND CLOTHING.

A case of scarlet fever in Bessemer city was believed to be due to infection from a former case in the same family one year previous.

Three cases of scarlet fever in Ronald township, Ionia county, were said to be due to the first child taken sick frequenting an old vacant house where a boy was sick with scarlet fever two months previous.

One case of scarlet fever in the village of Howell, in January, 1904, was said to be due to a case of scarlet fever in the same house during the preceding summer.

Eleven cases of scarlet fever occurred in the village and township of Montague, Muskegon county, as the result of infection, in the houses, clothing, etc., from cases in the preceding year.

One case of scarlet fever in Rose township, Ogemaw county, was said to be due to the disease having been in the same house a year previous.

One case of scarlet fever in Johnstown township, Barry county, was traced to infected bed clothing, brought from South Dakota, which had been packed away three years before.

One case of scarlet fever in Breen township, Dickinson county, in September, 1904, was said to be due to clothing which escaped thorough disinfection when the patient's baby had scarlet fever in May, 1903.

One case of scarlet fever in Kalamo township, Eaton county, on January 15, 1904, was traced to an infected quilt which the father of the patient brought from Vermontville, in the latter part of December, 1903, and several days after placed it on the bed of the patient. The quilt was said to be infected with diphtheria as well as scarlet fever, and both diseases appeared in the patient, diphtheria first and scarlet fever two days later.

Four cases of scarlet fever in the city of Ionia, were due to the mother of the sick family helping a neighbor unpack a box of clothing sent her from Grand Rapids, and said to be infected.

Six cases of scarlet fever in Woodmere village, resulted from the neglect to disinfect some of the clothing worn by a former patient, in the same family, one year before.

SCARLET FEVER IN 1904, SAID TO BE DUE TO INFECTED WALL PAPER.

Six cases of scarlet fever in Athens village, Calhoun county, were said to be due to taking off wall paper from a residence where there had been a case of scarlet fever several years previous.

One case of scarlet fever in Paradise township, Grand Traverse county, was reported as due to pulling off old paper in building where there had been scarlet fever two or three years previous.

SCARLET FEVER MISTAKEN FOR MEASLES.

Three cases of scarlet fever in Muskegon Heights city, in 1904, were reported as due to infection from a young man from the country who had recently recovered from what was supposed to be measles, and who had not had the services of a physician during his sickness.

SCARLET FEVER IN 1904, SAID TO BE DUE TO INFECTED LETTERS.

One case of scarlet fever in Albion city, was reported as presumably due to a letter received from a relative who had the disease.

Two cases of scarlet fever, in Bedford township, Calhoun county, resulted from one of the patients chewing a letter received from a relative who had just been released from quarantine after scarlet fever.

One case of scarlet fever at Cedar Springs village, was thought to be due to a letter from an infected family at Sand Lake.

SCARLET FEVER SPREAD BY IMMIGRANTS.

In December, 1903, a party of immigrants from Russia arrived in Ossineke township, Alpena county, and soon after their arrival scarlet fever broke out in the family with whom they were staying. In January, 1904, the disease broke out in Wilson township, adjoining, and, upon investigation, the health officer of this township found that upon the arrival of the immigrants at Baltimore, two girls of the family were sick with scarlet fever and were removed to a hospital there, and detained about six to eight weeks. The rest of the family were allowed to proceed to Michigan, with the result before stated. No notice of the arrival of these sick and infected persons at Baltimore was received by the Michigan Department of Health, and therefore the health officer of the township for which they were destined could not be notified to keep them under surveillance until the danger period had passed.

They went to church and school in Wilson township, and infected many persons in this township, and possibly in Ossineke township.

There were forty-one cases and nine deaths in these outbreaks in the two townships named.

IMMIGRANTS, POSSIBLY INFECTED WITH SCARLET FEVER, DESTINED FOR POINTS IN MICHIGAN.

On May 10, 1904, a notice was received from the Dominion Immigration officer at Quebec, that the S. S. Sardinian, from Glasgow, had arrived at that Port on May 7th, with a case of scarlet fever on board, and that the patient had been removed to the Quarantine Station. A list of immigrants, destined for Detroit, was included with the notice.

On May 14, 1904, a notice was received from the U. S. Commissioner of Immigration at Philadelphia, Pa., that the S. S. Noordland, from Liverpool, had arrived at that port with a case of scarlet fever. The patient had been quarantined during the voyage, and, on arrival at Philadelphia, was removed to the Municipal Hospital. A list of immigrants destined for Frankfort and Ann Arbor, was included with the notice.

Copies of the above notices were mailed to the health officers of the several jurisdictions to which the immigrants were said to be going, but no cases of scarlet fever were reported from these localities as the result of the arrival of the immigrants.

REPORTED PERIODS OF INCUBATION IN SCARLET FEVER.

Table 78 indicates that the principal period of incubation in scarlet fever is 7 days. Other important periods shown are 10 and 14 days.

TABLE 78.—*Reported periods of incubation in scarlet fever, 1892-1903.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11	12
Instances in each day.....	19	72	100	128	135	117	315	145	29	216	37	54
Incubation period—days.....	13	14	15	16	17	18	20	21	22	23	24	25
Instances in each day.....	17	200	21	15	0	11	12	60	1	1	2	2
Incubation period—days.....	26	27	28	29	30	33	35	36	42	56		
Instances in each day.....	4	1	7	2	5	2	2	1	4	1		

THE INFLUENCE OF AGE AND SEX IN SCARLET FEVER.

Table 79 indicates that the greatest number of scarlet fever patients are from 5 to 9 years of age; the next greatest number under 5 years; and the next greatest number from 10 to 14 years.

Of the fatal cases of scarlet fever, by far the greatest number of decedents are under 5 years of age. Practically all the fatal cases are in children under 10 years of age.

At all ages, except in those under five years of age, scarlet fever seems to be most prevalent and most fatal among the females.

TABLE 79.—*The influence of age and sex in scarlet fever, as indicated by the numbers of those who died and recovered from this disease in the eleven years, 1893-1903. Arranged, by sex, in age periods of five years each.*

Age periods.	Fatal cases.						Non-fatal cases.					
	Numbers.			Per cent of all fatal cases, of known ages.			Numbers.			Per cent of all cases, of known ages, which recovered.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 5 years.....	457	447	904	27.2	26.6	53.7	3,985	3,904	7,889	12.3	12.1	24.4
5-9 years.....	264	267	531	15.7	15.9	31.6	6,407	7,325	13,732	19.8	22.6	42.4
10-14 years.....	47	82	129	2.8	4.9	7.6	2,943	3,824	6,767	9.1	11.8	2.09
15-19 years.....	24	25	49	1.4	1.5	2.9	898	1,200	2,098	2.8	3.7	6.5
20-24 years.....	9	26	35	.5	1.5	2.1	328	508	836	1.0	1.6	2.6
25-29 years.....	4	4	8	.2	.2	.5	150	274	424	.5	.8	1.3
30-34 years.....	9	7	16	.5	.4	.9	105	174	279	.3	.5	.8
35-39 years.....	2	5	7	.1	.3	.4	73	117	190	.2	.4	.6
40-44 years.....		2	2		.1	.1	31	66	97	.1	.2	.3
45-49 years.....		1	1		.1	.1	15	17	32	.04	.05	.1
50 and over.....	1		1	.1		.1	10	26	36	.03	.08	.1
All ages.....	817	866	1,683	48.5	51.5	100.0	14,945	17,435	32,380	46.17	53.83	100.0

THE DURATION OF SICKNESS IN SCARLET FEVER.

Table 80 indicates that the duration of sickness in non-fatal cases of scarlet fever extends from 6 to 30 days.

In fatal cases of scarlet fever, the sickness usually terminates in from one to five days. About 75 per cent of all the cases terminate before the sixteenth day.

TABLE 80.—*The duration of sickness in fatal and non-fatal cases of scarlet fever during the eleven years, 1893-1903.*

Duration periods.	Fatal cases.						Non-fatal cases.					
	Numbers.			Per cent of all cases of known duration.			Numbers.			Per cent of all cases of known duration.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1-5 days.....	213	227	440	18.2	19.4	37.6	331	329	660	1.4	1.4	2.8
6-10 days.....	142	146	288	12.1	12.5	24.6	1,497	1,723	3,225	6.2	7.2	13.4
11-15 days.....	74	86	160	6.3	7.3	13.6	2,021	2,417	4,438	8.4	10.1	18.5
16-20 days.....	42	54	96	3.6	4.6	8.2	1,923	2,151	4,074	8.0	9.0	17.0
21-25 days.....	42	38	80	3.6	3.2	6.8	1,985	2,388	4,373	8.2	10.0	18.2
26-30 days.....	21	15	36	1.8	1.3	3.1	1,544	1,651	3,195	6.4	6.9	13.3
31-35 days.....	12	17	29	1.0	1.5	2.5	792	913	1,705	3.3	3.8	7.1
36-40 days.....	7	3	10	.6	.3	.9	462	501	963	1.9	2.1	4.0
41-45 days.....	3	6	9	.3	.5	.8	308	344	652	1.3	1.4	2.7
46-50 days.....	4	6	10	.3	.5	.8	169	170	339	.7	.7	1.4
51 and over.....	7	6	13	.6	.5	1.1	189	187	376	.8	.8	1.6
Totals.....	567	604	1,171	48.4	51.6	100.0	11,221	12,779	24,000	46.6	53.4	100.0

RESTRICTIVE AND PREVENTIVE MEASURES IN SCARLET FEVER.

When it is remembered that for 28 years the State Health Department has conducted an active campaign against scarlet fever, and that in every outbreak which has come to the knowledge of the Department the health officer has been prompted by the Department as to the best methods for restricting the disease, and has been supplied with literature for distribution among the families and neighbors of the sick persons, the figures shown in Table 81 are not a very encouraging sample of results. It is gratifying to note, however, that the numbers of outbreaks in which isolation and disinfection were both enforced has increased from 7 per cent in 1891 to 25 per cent in 1904.

In the 188 outbreaks shown in Table 81, in which isolation was enforced and disinfection neglected or doubtful, the principal obstacle to the completeness of the restrictive measures was the use of a smaller amount of disinfecting material than the standard amount recommended by this Department.

There are very many new health officers to be educated each year in the methods of restricting disease, and many of them not only do not receive ample compensation for their labors, but are often denied the support and appreciation which their labors demand, and sometimes subjected to abuse. Under such conditions, it is not strange that many outbreaks of disease are not restricted to the first case, or to the one household where the outbreak begins.

TABLE S1.—*Isolation of sick persons, and disinfection of infected premises, in outbreaks of scarlet fever, in Michigan, in 1904.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	183	25.0
Both neglected.....	3	.4
Isolation enforced, disinfection neglected or doubtful.....	188	25.7
Disinfection enforced, isolation neglected or doubtful.....	39	5.3
Isolation and disinfection not mentioned in the reports, or statements doubtful.....	319	43.6
 All outbreaks*.....	 732	 100.0

*There were 106 outbreaks which began in a preceding year, or were continued into 1905, which cannot be included in this table, because the extent of the restrictive measures is not definitely known.

A MILD TYPE OF SCARLET FEVER.

In December, 1904, the health officer of Rush township, Shiawassee county, reported an outbreak of scarlet fever of a very mild type, and which, in some other localities where the health officers might not have been so willing to give the public the benefit of a doubt, might have been neglected, and formed the nucleus of a serious epidemic. His letter describing the cases is interesting and is here printed:

"There is in my jurisdiction a disease which I report to you as being scarlet fever. It has some characteristics of scarlet fever but it is much milder. I have enforced restrictions upon infected households as in ordinary severe cases.

"I will describe it to you briefly as I have seen it in the four cases reported.

"Begins suddenly without premonitory symptoms, fever rises in the first few hours to 102° to 103° F., in 24 hours they are broken out with a scarlet rash which disappears in from 12 to 24 hours and with it the fever and all other symptoms.

"There is no sore throat and no desquamation. It is quite difficult for me to convince some people it ought to be dealt with as ordinary scarlet fever and one family is making me a little trouble.

"I wish you would write me a letter that I may carry in case I should need it, explaining what I should do to protect the public."

SCARLET FEVER EPIDEMIC IN CALUMET TOWNSHIP, Houghton County.

In 1903, there were 45 cases and 11 deaths from scarlet fever, and the outbreak was continued into 1904, during which year there were 100 cases and 21 deaths. The outbreak was of unusual severity, and had not ended at the close of the year 1904.

SCARLET FEVER IN SALEM TOWNSHIP, ALLEGAN COUNTY.

There were two cases and one death from scarlet fever in July, 1903, said to have been contracted in Grand Rapids. In this outbreak isolation was enforced, but the disinfection was doubtful.

There were seven cases of scarlet fever in this locality in January, 1904, and ten cases in September, October, November and December, and the outbreak was continued into 1905.

Reporting upon the outbreak in January, 1904, the health officer stated that by reason of the smallness of the houses, and the cold weather, he could not separate the sick from the well persons, and that at the close of the outbreaks, he could not disinfect with sulphur or formaldehyde in the usual manner. Clothing was washed and aired.

The source of the outbreaks in the latter part of 1904 were reported as doubtful or unknown. It is believed, however, that the lack of proper disinfection in the preceding outbreaks was responsible for the subsequent outbreaks.

Reporting upon the outbreaks in the latter part of 1904, the health officer wrote this Department as follows:

"I wish to write you in regard to disinfecting houses where we have scarlet fever and typhoid fever. We are unable to disinfect by using fumes of burning sulphur or by formaldehyde. In most cases houses are small, partition walls are not tight, others have arch doorways where we cannot fumigate while the family is in the house. We have people who had typhoid and recovered from it as far as the fever is concerned, but will be unable to leave the house this winter, perhaps not until warm weather comes. In these cases we put clothing that cannot be washed into boxes or barrels and apply formaldehyde, then hang out to air.

"During warm weather we got along quite well, families could vacate the house, go to the barn or granary. Where houses are large we get along all right. We will do the best. We cannot follow out the instruction given by the State Board in every case."

To this letter, the Secretary of the Department replied as follows:

"Your letter, relative to the difficulty of fumigating certain households, is before me, and in reply, permit me to call your attention to the law which provides for such emergency. 'The inhabitants of any township may establish within their township, and be constantly provided with, one or more hospitals for the reception of persons having the smallpox, or other disease which may be dangerous to the public health.' [Section 4444, Compiled Laws 1897.] If your jurisdiction had such a hospital, infected persons could be harbored there while the required disinfection is made. Since the law is imperative relative to disinfection of infected premises, the township should immediately establish a place for infected persons to go to until their domicile is disinfected. Perhaps the Board may obtain a vacant house?

"I think the conditions you describe are very general throughout the State. I am glad to have your letter describing them, and promising to do your best under the circumstances."

SCARLET FEVER IN PONTIAC IN 1904.

Weekly postal-card reports of sickness made by the health officer of Pontiac, in the capacity of a voluntary observer, showed scarlet fever to have been under his personal observation during the weeks ending May 28; June 4, 18 and 25; July 2 and 30; October 8 and 22; November 12 and 26, and December 3. Repeated requests from this Department failed to bring the usual reports from the health officer, so that it is impossible to learn the extent of the several outbreaks, and the nature and extent of the measures taken for the restriction of the disease.

MEASLES IN MICHIGAN IN 1904 AND PRECEDING YEARS.

During the year 1904, there were reported to the Michigan State Department of Health 766 outbreaks of measles, in 615 localities, which resulted in 10,386 cases, including 176 deaths.

Only the fatal cases were reported from Detroit, and very many cases occurred in localities throughout the State which were not reported to the local health officials, and therefore could not be reported to the State Health Department.

In 1904, compared with the preceding year, there were 1,445 cases and 36 deaths more, from this disease.

In 1904, compared with the average for 14 years, 1890-1903, there were 1,554 cases less, and 47 more deaths, from this disease.

A comparison of Tables 82 and 83 will show that the average death rate from measles in recent years is about 40 per cent less than the average of the years 1869-1889.

TABLE 82.—*The general prevalence of measles in Michigan during the fifteen years, 1890-1904.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.*	Reported deaths.	Deaths per 100 cases.*	Deaths per 100,000 of the population.
1890.....	2,093,889	11,911	140	1.2	6.7
1891.....	2,130,827	12,173	149	1.2	7.0
1892.....	2,167,765	3,830	76	2.0	3.5
1893.....	2,204,703	7,334	119	1.6	5.4
1894.....	2,241,641	10,518	55	.5	2.5
1895.....	2,271,531	3,870	12	.3	.5
1896.....	2,301,421	15,409	156	1.0	6.8
1897.....	2,331,311	32,543	159	.5	6.8
1898.....	2,361,201	11,614	124	1.1	5.3
1899.....	2,391,091	12,005	166	1.4	6.9
1900.....	2,420,982	20,403	282	1.4	11.6
1901.....	2,450,872	4,629	62	1.3	2.5
1902.....	2,475,499	11,978	162	1.4	6.5
1903.....	2,502,758	8,941	140	1.6	5.6
1904.....	2,530,016	10,386	176	1.7	7.0
Averages per year.....	2,325,034	11,836	132	1.1	5.7

*Only the fatal cases were reported from Detroit, and probably many other localities, so that the figures in this column do not nearly represent the numbers of cases which occurred.

TABLE S3.—*The numbers of deaths from measles per 100,000 persons living, in Michigan, in each of the twenty-one years, 1869–1889. Compiled from reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Deaths.....	12.9	4.7	5.5	14.1	18.6	3.4	9.5	8.1	4.1	1.0	10.5
Years.....	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	
Deaths.....	7.6	15.2	8.7	14.5	7.9	2.0	6.8	14.6	20.6	5.1	

GEOGRAPHICAL DISTRIBUTION OF MEASLES.

Table 84 indicates that, compared with the average death rate for the entire State for the same period (5.7 per 100,000), measles was much more prevalent than usual in the Northern Central and Northern Divisions, and quite evenly distributed throughout the other divisions. It was least prevalent in the Central Division.

The counties in which measles was unusually prevalent in the twelve years, 1893-1904, placed in the order of greatest death rates, are:

Missaukee county.....	death rate 23.0 per 100,000
Alger county.....	" " 20.9 " 100,000
Baraga county.....	" " 20.9 " 100,000
Oscoda county.....	" " 17.4 " 100,000
Bay county.....	" " 15.8 " 100,000
Alcona county.....	" " 14.5 " 100,000
Luce county.....	" " 14.4 " 100,000
Antrim county.....	" " 13.7 " 100,000
Delta county.....	" " 13.0 " 100,000
Dickinson county.....	" " 12.1 " 100,000
Oceana county.....	" " 11.7 " 100,000
Crawford county.....	" " 10.3 " 100,000
Montmorency county.....	" " 9.7 " 100,000
Mecosta county.....	" " 9.6 " 100,000
Kalkaska county.....	" " 9.2 " 100,000
Ogemaw county.....	" " 8.8 " 100,000
Isabella county.....	" " 8.7 " 100,000
Benzie county.....	" " 8.2 " 100,000
Leelanau county.....	" " 7.7 " 100,000
Allegan county.....	" " 7.7 " 100,000
Marquette county.....	" " 7.6 " 100,000
Branch county.....	" " 7.6 " 100,000
Iron county.....	" " 7.3 " 100,000
Manistee county.....	" " 7.3 " 100,000
Emmet county.....	" " 7.2 " 100,000
Clare county.....	" " 7.1 " 100,000

TABLE S4.—*The geographical distribution of measles, in Michigan, in the twelve years, 1893–1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living, in each geographical division shown in the table.*

Geographical divisions.	Average.			
	Population.	Cases.*	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.	240,251	1,477	16.68	6.9
Alger county.....	4,794	36	1	20.9
Baraga county.....	4,781	9	1	20.9
Chippewa county.....	18,956	61	1	5.3
Delta county.....	22,990	88	3	13.0
Dickinson county.....	16,487	59	2	12.1
Gogebic county.....	15,657	116	.8	5.1
Houghton county.....	56,805	429	2	3.5
Iron county.....	6,877	47	.5	7.3
Keweenaw county.....	3,188	29	.2	6.3
Luce county.....	2,769	14	.4	14.4
Mackinac county.....	7,372	57	.08	1.1
Marquette county.....	39,701	391	3	7.6
Menominee county.....	25,307	33	1	4.0
Ontonagon county.....	6,587	54	.3	4.6
Schoolcraft county.....	7,980	54	.4	5.0
NORTHWESTERN DIVISION.	84,508	488	5.6	6.6
Benzie county.....	9,793	81	.8	8.2
Grand Traverse county.....	20,531	117	1	4.9
Leelanau county.....	10,422	53	.8	7.7
Manistee county.....	27,247	165	2	7.3
Wexford county.....	16,515	72	1	6.1
NORTHERN DIVISION.	72,154	493	5.5	7.6
Antrim county.....	14,550	131	2	13.7
Charlevoix county.....	13,129	102	.6	4.6
Cheboygan county.....	15,494	35	.7	4.5
Crawford county.....	2,918	22	.3	10.3
Eenmet county.....	13,818	126	1	7.2
Kalkaska county.....	6,501	56	.6	9.2
Otsego county.....	5,744	21	.3	5.2
NORTHEASTERN DIVISION.	54,657	243	3.1	5.7
Alcona county.....	5,533	51	.8	14.5
Alpena county.....	18,875	58	.6	3.2
Iosco county.....	10,688	25	.3	2.8
Montmorency county.....	3,106	30	.3	9.7
Ogemaw county.....	6,823	48	.6	8.8
Oscoda county.....	1,724	2	.3	17.4
Presque Isle county.....	7,908	29	.2	2.5
WESTERN DIVISION.	268,022	2,114	13.08	4.9
Kent county.....	130,510	1,348	6	4.6
Lake county.....	5,337	30	.08	1.5
Mason county.....	19,359	79	1	5.2
Muskegon county.....	36,490	181	2	5.5
Newaygo county.....	18,282	78	1	5.5
Oceana county.....	17,104	152	2	11.7
Ottawa county.....	40,940	246	1	2.4
NORTHERN CENTRAL DIVISION.	101,166	625	8.66	8.6
Clare county.....	8,431	72	.6	7.1
Gladwin county.....	6,220	19	.08	1.3
Isabella county.....	23,049	165	2	8.7
Mecosta county.....	20,916	143	2	9.6
Midland county.....	14,515	76	.9	6.2
Missaukee county.....	8,691	45	2	23.0
Oswego county.....	17,754	97	1	5.6
Roscommon county.....	1,590	8	.08	5.0

*This footnote is below Table 82, on a preceding page.

TABLE 84.—*Concluded.*

Geographical divisions	Average.			
	Population.	Cases.*	Deaths.	Death rates.
BAY AND EASTERN DIVISIONS.	342,271	1,191	17.8	5.2
Arenac county.....	8,585	18	.2	2.3
Bay county.....	63,401	288	10	15.8
Huron county.....	34,295	52	.8	2.3
Lapeer county.....	28,142	121	.8	2.8
Saginaw county.....	52,380	275	3	3.6
Sanilac county.....	34,764	156	1	2.9
St. Clair county.....	55,097	197	1	1.5
Tuscola county.....	35,598	84	1	2.8
CENTRAL DIVISION.	316,083	1,829	12.7	4.0
Barry county.....	23,079	172	.8	3.5
Clinton county.....	25,736	146	1	3.9
Eaton county.....	32,174	290	1	3.1
Genesee county.....	41,600	191	1	2.4
Gratiot county.....	29,406	175	2	6.8
Ingham county.....	41,122	176	2	4.9
Jonia county.....	35,266	189	1	2.8
Livingston county.....	19,781	127	.9	4.5
Montcalm county.....	34,122	122	2	5.9
Shiawassee county.....	33,797	241	1	3.0
SOUTHWESTERN DIVISION.	140,974	957	9	6.4
Allegan county.....	39,127	283	3	7.7
Berrien county.....	48,421	315	3	6.2
Cass county.....	20,940	112	1	4.8
Van Buren county.....	32,486	247	2	6.2
SOUTHERN CENTRAL DIVISION.	317,422	2,203	14	4.4
Branch county.....	26,410	221	2	7.6
Calhoun county.....	50,158	335	2	4.0
Hillsdale county.....	29,983	232	2	6.7
Jackson county.....	47,447	223	1	2.1
Kalamazoo county.....	44,943	412	3	6.7
Lenawee county.....	48,656	368	1	2.1
St. Joseph county.....	24,372	183	1	4.1
Washtenaw county.....	45,453	232	2	4.4
SOUTHEASTERN DIVISION.	444,505	756	28	6.3
Macomb county.....	32,880	85	1	3.0
Monroe county.....	33,284	126	2	6.0
Oakland county.....	44,173	255	2	4.5
Wayne county.....	334,168	290	23	6.9

*This footnote is below Table S2, on a preceding page.

THE SEASONAL PREVALENCE OF MEASLES.

Table 85 shows that, in Michigan, measles is most prevalent in the month of May and least prevalent in September. The greatest prevalence occurs in the months of February to June, both inclusive.

TABLE 85.—*The seasonal prevalence of measles as indicated by the average numbers of persons taken sick in each month in the eight years, 1897–1904.*

Months.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average number of cases taken sick	853	1,056	1,382	1,515	1,675	1,252	483	171	130	277	417	631

REPORTED SOURCES OF CONTAGIUM IN MEASLES.

Table 86 shows that the source of the contagium in measles is given in but 31 per cent of the cases reported. Of this number nearly all are reported as due to direct infection, and a very small proportion to infected houses, articles, etc.

About 18 per cent of the cases of measles which are traced to their source are due to the movement from one locality to another of persons infected with or who have been exposed to the disease.

TABLE 86.—*The reported sources of contagium in measles, in Michigan, in the thirteen years, 1892-1904.*

Reported sources, etc.	Number of cases.
Traced to a former case.....	38,358
Probably traced to a former case.....	631
Traced to outside jurisdictions.....	8,677
Probably from outside jurisdictions.....	417
Contracted at school.....	126
From infected houses, articles, clothing, etc.....	23
From infected letters.....	6
Total cases in which a source of contagium was reported.....	48,238
Source reported as unknown, or not definitely stated.....	72,547
Source not mentioned*.....	32,675
Total cases reported in the thirteen years, 1892-1904.....	153,460

*In each year, many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreaks first began.

THE INFLUENCE OF AGE AND SEX IN MEASLES.

Table 87 indicates that the greatest number of persons sick with measles are between the ages of 4 and 10 years; the next greatest number under 5 years of age, and the next greatest number between the ages of 9 and 15 years. Practically all the cases occur before the age of manhood, and from middle life to old age there is but little more than 1 per cent of the total cases in which the age is given.

At the early ages the males are slightly more susceptible to measles than are the females, but after the twenty-fifth year the susceptibility is slightly greater among the females.

Of the fatal cases, in the 11 years, 1893-1903, 64 per cent of those who died from measles were under five years of age, and 76 per cent were under 10 years of age. As a rule, the fatality decreased with each increase in age, and was slightly greater among the females.

TABLE 87.—*The influence of age and sex in measles, as indicated by the numbers of those who recovered or died from this disease, in the eleven years, 1893-1903. Arranged, by sex, in age groups of five years each.*

Age periods.	Non-fatal cases.						Fatal cases.					
	Numbers.			Per cent of all non-fatal cases, of known ages.			Numbers.			Per cent of all fatal cases, of known ages.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 5 years.....	6,339	6,179	12,518	12.0	11.7	23.7	299	324	623	30.7	33.3	64.0
5 to 9 years.....	10,750	10,388	21,138	20.3	19.7	40.0	63	54	117	6.5	5.5	12.0
10 to 14 years.....	4,247	4,462	8,709	8.0	8.4	16.5	23	28	51	2.4	2.9	5.2
15 to 19 years.....	2,231	2,255	4,486	4.2	4.3	8.5	31	27	58	3.2	2.8	6.0
20 to 24 years.....	1,388	1,147	2,535	2.6	2.2	4.8	18	11	29	1.9	1.1	3.0
25 to 29 years.....	645	617	1,262	1.2	1.2	2.4	10	16	26	1.0	1.7	2.7
30 to 34 years.....	406	515	921	.8	1.0	1.7	3	10	13	.3	1.0	1.3
35 to 39 years.....	273	345	618	.5	.7	1.2	6	15	21	.6	1.5	2.2
40 to 44 years.....	155	194	349	.3	.4	.7	7	7	14	.7	.7	1.4
45 to 49 years.....	64	94	158	.1	.2	.3	0	6	6	.0	.6	.6
50 to 54 years.....	31	44	75	.06	.08	.1	2	4	6	.2	.4	.6
55 to 59 years.....	12	23	35	.02	.04	.07	3	1	4	.3	.1	.4
60 years and over.....	27	26	53	.05	.05	.1	1	5	6	.1	.5	.6
All ages.....	26,568	26,289	52,857	50.13	49.97	100.0	466	508	974	47.9	52.1	100.0

THE DURATION OF SICKNESS IN MEASLES.

Table 88 indicates that, as a rule, the sickness from measles lasts from 6 to 15 days, the greatest number of cases terminating between the eleventh and fifteenth days.

Of the fatal cases, the greatest number of cases terminated between the fifth and eleventh days, the next greatest number between the first and sixth days, and the next, and much smaller number, between the tenth and sixteenth days. Practically all the cases died before the sixteenth day.

TABLE 88.—*The duration of sickness in non-fatal and fatal cases of measles, in the twelve years, 1892-1903.*

Duration periods.	Non-fatal cases.						Fatal cases.					
	Numbers.			Per cent of all cases of known duration.			Numbers.			Per cent of fatal cases of known duration.		
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
1 to 5 days.....	1,063	1,024	2,087	2.72	2.63	5.35	77	102	179	14.69	19.47	34.16
6 to 10 days.....	6,872	6,668	13,540	17.62	17.09	34.71	87	106	193	16.60	20.23	36.83
11 to 15 days.....	7,235	7,310	14,545	18.55	18.74	37.29	29	42	71	5.53	8.02	13.55
16 to 20 days.....	1,997	1,993	3,990	5.12	5.11	10.23	25	15	40	4.77	2.86	7.03
21 to 25 days.....	1,426	1,439	2,865	3.65	3.69	7.34	8	8	16	1.53	1.53	3.06
26 to 30 days.....	519	524	1,043	1.33	1.34	2.67	7	5	12	1.34	.95	2.29
31 to 35 days.....	202	148	350	.52	.38	.90	1	2	3	.19	.38	.57
36 to 40 days.....	114	124	238	.29	.32	.61	2	1	3	.38	.19	.57
41 to 45 days.....	86	70	156	.22	.18	.40	0	0	0	.00	.00	.00
46 to 50 days.....	33	41	74	.08	.11	.19	0	1	1	.00	.19	.19
51 to 55 days.....	19	19	38	.05	.05	.10	0	0	0	.00	.00	.00
56 and over.....	40	42	82	.10	.11	.21	1	5	6	.19	.95	1.15
Totals.....	19,006	19,402	39,008	50.25	49.75	100.00	237	257	524	45.23	54.77	100.00

RESTRICTIVE AND PREVENTIVE MEASURES IN MEASLES.

Table 89 indicates that, in 1904, in but 3 per cent of all the outbreaks of measles were the restrictive and preventive measures of isolation and disinfection both enforced.

TABLE 89.—*Isolation of sick persons, and disinfection of infected premises, in outbreaks of measles, in Michigan, in 1904.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	24	3.28
Both neglected.....	15	2.05
Isolation and disinfection not mentioned in the reports, or statements doubtful.....	693	94.67
All outbreaks*.....	732	100.00

*There were 34 outbreaks which began in a preceding year, or were continued into 1905, which cannot be included in this table, because the extent of the restrictive measures is not definitely known.

The apathy of the public in respect to the restriction and prevention of measles has done much to discourage those who would put forth their best energies in this work, yet there are many health officers and medical practitioners who, notwithstanding opposition of all kinds, are carrying on, with varying success, a determined warfare against this often underestimated, but really dangerous disease. The following extracts from letters along this line may be of interest:

"Please inform me as to existing regulations in respect to epidemics of measles. The disease has been permitted to run riot in this village when it might easily have been controlled, but no case has been quarantined. I have just been appointed village health officer and the discontented ones are getting ready to butt in en masse. Please instruct me."

"The enclosed Final Report is necessarily only approximately correct. The outbreak occurred before I was appointed village health officer and although I reported my cases a number of times no attention was paid to them or to any other cases, as far as restriction and prevention are concerned. The number stated is well within the limit as many cases were not attended by physicians and no record can be had of them."

"Measles and whooping-cough have been wholly ignored, and during the past year nearly every child in the township and many grown people have had both. So far as I am aware none have actually died directly from these diseases, although many have been near death. Some are left in bad shape, and many never fully recover.

"Please answer me this question. Can one contract the measles (red) from a case of German measles? I have had a cross with a brother practitioner. He allowed a girl to go to school with the German measles. I sent her home and quarantined the house. Am I right?"

"There has been an outbreak of measles in this township, at the prolific end of my jurisdiction, since about April 1, 1904, and I was not notified until about April 25, when I found a great many houses infected, perhaps fifteen or more homes, some of which were recovered, others in the height of the disease. When asked why they did not report to the health officer, said they did not know it was necessary. Some had had physicians, others had none.

"One doctor here attended several patients, one of whom died, and did not report until I asked him about it. He said he did not know who the health officer was, nor did he know where the township lines were.

"I have been very busy since the outbreak placarding and disinfecting. Have not had time to make a weekly report but am keeping a careful record which I will send in as soon as the disease has subsided. I find some people who do not want their houses disinfected because it has been three weeks since they all recovered and they do not think it necessary. What shall I do in a case where the householder does positively refuse to let me disinfect?

"Am sorry to say that our supervisor seems to treat this matter lightly and does not take the interest he should, thinking the expense is too great, etc. I wish you would impress on him the importance of this work and wake him up to a sense of his duty."

"We don't report measles, chicken-pox or whooping-cough from this town as the township board won't allow expenses for so doing. Only about half the people send for a doctor for these diseases, and when they do not I can't go

and placard the house unless I can get my pay for it and if the township board won't pay for such services willingly, I don't feel like insisting on it."

"Trying to quarantine for measles in this town is certainly a howling failure and a farce, and I am going to give it up. The families pay no attention whatever to the quarantine, let other people come in the house, go out freely themselves and send children of the family, not sick, to school. One case especially I notified the mother to stay at home one week but she works in a bean picking elevator and she was right on hand Monday morning, utterly disregarding my instructions, and sent the boy to school on Wednesday or Thursday when I only quarantined them the preceding Friday. The epidemic is of so mild a character that the people all *want it* and get rid of it and I cannot do a thing with them without making enemies. Even the teachers in the school say it don't amount to anything, and as it is the very last of the term, they want every student there, measles or no measles.

"Smallpox is the only thing I believe they would stay at home for, and I have my doubts even then."

MEASLES PROBABLY SPREAD BY IMMIGRANTS IN 1904.

An outbreak of measles in St. Charles township, Saginaw county, was reported as due to the arrival there of an immigrant from Europe. The prompt action of the health officer in instituting and maintaining restrictive measures limited the outbreak to two persons.

An outbreak of measles at Cross Village township, Emmet county, was reported as having originated in a family who came from Europe to Petoskey, and later moved to Cross Village township.

An outbreak of measles in Lincoln township, Berrien county, occurred in a family from Russia, and the health officer stated that the disease was contracted en route to this country.

During the year 1904, seven notices were received from the immigration officers at Canadian ports, and one notice was received from the U. S. Commissioner of Immigration at Philadelphia, Pa., that measles had occurred on board steamships arriving at these ports, and giving lists of names and destinations of passengers intending to settle in Michigan. Copies of these notices were promptly mailed to the health officers of the several jurisdictions, but no cases of measles were traced to any of the immigrants named in the notices.

SMALLPOX IN MICHIGAN IN 1904 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1904, there were reported to the State Department of Health 714 outbreaks of smallpox, in 540 localities, resulting in 5,753 cases, including 24 deaths.

In 1904, compared with the preceding year, there were 588 cases and 9 deaths less; and in 1904, compared with the average for the three years, 1901-1903, there were 419 cases and 11 deaths less, from this disease.

A comparison of smallpox in 1904 with the years prior to 1901 may be made by reference to Table 90, in which it will be seen that from 1882 to 1901 there was, comparatively, but little smallpox in the State. The fatality (deaths per 100 cases), however, was very much greater in the years preceding 1901, in which deaths occurred.

Table 91 shows that the average death rates from smallpox, per 100,000 of the population, for thirteen years prior to the compilation of the disease by the State Department of Health, was very much greater than the average for the twenty-three years since that time.

TABLE 90.—*The general prevalence of smallpox in Michigan during the twenty-three years 1882-1904.*

Years.	Population. (Estimated for intercensal years.)	Reported cases.	Reported deaths.	Deaths per 100 cases.	Deaths per 100,000 of the population.
1882.....	1,745,298	559	159	27.0	.91
1883.....	1,799,478	29	2	6.9	.1
1884.....	1,853,658	22	3	13.6	.2
1885.....	1,893,697	27	6	22.2	.3
1886.....	1,933,735	24	7	29.2	.4
1887.....	1,973,774	4	0	0	0
1888.....	2,013,812	42	6	14.3	.3
1889.....	2,053,851	57	4	7.0	.2
1890.....	2,093,889	2	0	0	0
1891.....	2,130,827	3	0	0	0
1892.....	2,167,765	1	1	100.0	.05
1893.....	2,201,703	10	3	30.0	.1
1894.....	2,241,641	255	60	21.1	2.7
1895.....	2,271,531	187	47	25.1	2.1
1896.....	2,301,421	38	16	42.1	.7
1897.....	2,331,311	15	0	0	0
1898.....	2,361,201	32	1	3.1	.04
1899.....	2,391,091	139	6	4.3	.3
1900.....	2,420,982	694	9	1.3	.4
1901.....	2,450,872	5,088	31	.6	1.3
1902.....	2,475,499	7,086	40	.6	1.6
1903.....	2,502,758	6,341	33	.5	1.3
1904.....	2,530,016	5,753	24	.4	.9
Averages per year.....	2,180,122	1,151	20	1.7	.9

TABLE 91.—*The numbers of deaths from smallpox per 100,000 persons, living in Michigan, in each of the thirteen years, 1869–1881. Compiled from the reports to the Secretary of State.*

Years.....	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
Deaths.....	3.7	0.8	6.0	23.7	7.0	1.3	1.8	5.2	6.8	0.4	0.4	0.2	4.9

GEOGRAPHICAL DISTRIBUTION OF SMALLPOX.

Table 92 indicates that, according to the average death rate from smallpox for the entire State (.8 per 100,000 of the population), during the seven years, 1898–1904, smallpox was more prevalent than usual in the Upper Peninsula, Northern, Northeastern, Northern Central, Bay and Eastern, and Southeastern divisions.

The counties in which smallpox was much more than usually prevalent during the seven years, 1898–1904, placed in the order of greatest death rates, are:

Presque Isle county.....	death rate 4.4	per 100,000
Mackinac county.....	" " 4.0	" 100,000
Emmet county.....	" " 3.8	" 100,000
Delta county	" " 3.6	" 100,000
Chippewa county.....	" " 2.9	" 100,000
Osceola county.....	" " 2.2	" 100,000
Antrim county.....	" " 1.9	" 100,000
Jackson county.....	" " 1.9	" 100,000
Cheboygan county.....	" " 1.8	" 100,000
Mason county...	" " 1.5	" 100,000
Kalkaska county.....	" " 1.4	" 100,000
Isabella county.....	" " 1.3	" 100,000
Clinton county.....	" " 1.2	" 100,000
Van Buren county.....	" " 1.2	" 100,000
Macomb county.....	" " 1.2	" 100,000

TABLE 92.—*The geographical distribution of smallpox in Michigan in the seven years, 1898-1904, as indicated by the average numbers of cases and deaths, and the average deaths per 100,000 persons living in each geographical division shown in the table.*

Geographical divisions.	Average.			
	Population.	Cases.	Deaths.	Death rates.
UPPER PENINSULAR DIVISION.				
Alger county.....	259,693	309	3.1	1.2
Baraga county.....	5,901	7	0	0
Baraga county.....	4,959	9	0	0
Chippewa county.....	20,962	42	.6	2.9
Delta county.....	24,951	42	.9	3.6
Dickinson county.....	17,592	11	0	0
Gogebic county.....	16,474	13	0	0
Houghton county.....	64,263	49	.6	.9
Iron county.....	8,702	4	0	0
Keweenaw county.....	3,502	2	0	0
Luce county.....	3,088	5	0	0
Mackinac county.....	7,574	23	.3	4.0
Marquette county.....	40,497	24	.4	1.0
Menominee county.....	26,281	60	.3	1.1
Ontonagon county.....	6,591	2	0	0
Schoolcraft county.....	8,356	16	0	0
NORTHWESTERN DIVISION.				
Benzie county.....	88,797	91	.4	.5
Grand Traverse county.....	10,525	17	0	0
Leelanau county.....	21,942	33	.3	1.4
Manistee county.....	10,827	3	0	0
Wexford county.....	27,730	7	0	0
NORTHERN DIVISION.				
Antrim county.....	78,595	268	1.3	1.7
Charlevoix county.....	15,706	34	.3	1.9
Cheboygan county.....	14,391	42	0	0
Crawford county.....	16,291	71	.3	1.8
Emmet county.....	3,112	10	0	0
Kalkaska county.....	15,737	41	.6	3.8
Otsego county.....	7,030	33	.1	1.4
NORTHEASTERN DIVISION.				
Alcona county.....	56,827	220	.6	1.1
Alpena county.....	5,613	26	0	0
Alpena county.....	19,321	68	.1	.5
Osceola county.....	10,022	44	.1	1.0
Montmorency county.....	3,413	14	0	0
Ogemaw county.....	7,659	31	0	0
Oscoada county.....	1,683	4	0	0
Presque Isle county.....	9,116	33	.4	4.4
WESTERN DIVISION.				
Kent county.....	272,400	328	1.3	.5
Lake county.....	134,488	133	.7	.5
Mason county.....	5,045	15	0	0
Muskegon county.....	19,666	50	.3	1.5
Newaygo county.....	36,374	27	.1	.3
Oceana county.....	17,921	18	.1	.6
Ottawa county.....	17,304	37	0	0
NORTHERN CENTRAL DIVISION.				
Clare county.....	104,827	423	1.0	1.0
Gladwin county.....	8,651	39	.1	1.2
Isabella county.....	7,039	33	0	0
Mecosta county.....	23,725	115	.3	1.3
Midland county.....	20,865	67	.1	.5
Missaukee county.....	14,984	39	0	0
Oscoda county.....	9,591	50	.1	1.0
Roscommon county.....	18,333	70	.4	2.2

TABLE 92.—CONCLUDED.

Geographical divisions.	Average.			
	Population.	Cases.	Deaths.	Death rates.
BAY AND EASTERN DIVISION.	345,646	778	3.0	.9
Arenac county.....	9,533	34	.1	1.0
Bay county.....	64,026	204	.7	1.1
Huron county.....	35,090	74	.4	1.1
Lapeer county.....	27,676	36	.1	.4
Saginaw county.....	82,853	167	.9	1.1
Sanilac county.....	35,107	88	.3	.9
St. Clair county.....	55,256	50	.4	.7
Tuscola county.....	36,105	65	.1	.3
CENTRAL DIVISION.	316,158	532	1.4	.4
Barry county.....	22,651	26	0	0
Clinton county.....	25,404	61	.3	1.2
Eaton county.....	31,764	45	.1	.3
Genesee county.....	42,147	71	.4	.9
Gratiot county.....	29,837	101	.3	1.0
Ingham county.....	41,755	21	0	0
Ionia county.....	35,225	70	.1	.3
Livingston county.....	19,357	4	0	0
Montcalm county.....	33,825	71	.1	.3
Shiawassee county.....	34,133	62	.1	.3
SOUTHWESTERN DIVISION.	142,820	112	.8	.6
Allegan county.....	39,042	23	0	0
Berrien county.....	49,635	42	.4	.8
Cass county.....	20,731	9	0	0
Van Buren county.....	33,412	38	.4	1.2
SOUTHERN CENTRAL DIVISION.	321,456	178	2.2	.7
Branch county.....	26,660	8	.3	1.1
Calhoun county.....	51,368	58	.3	.6
Hillsdale county.....	29,847	24	.1	.3
Jackson county.....	47,831	23	.9	1.9
Kalamazoo county.....	46,508	18	.4	.9
Lengwee county.....	48,721	10	.1	.2
St. Joseph county.....	23,909	12	.1	.4
Washtenaw county.....	46,612	25	0	0
SOUTHEASTERN DIVISION.	468,969	351	4.5	.9
Macomb county.....	33,131	40	.4	1.2
Monroe county.....	33,207	28	0	0
Oakland county.....	44,988	26	.1	.2
Wayne county.....	357,643	257	4	1.1

THE PREVALENCE OF SMALLPOX IN URBAN AND RURAL LOCALITIES IN MICHIGAN,
IN 1904.

Table 93 indicates that, judging by the per cent of infected localities and the death rates per 100,000 of the population, smallpox was most prevalent in the urban localities. The very high death rate of 5.4 per 100,000, in the second group of cities, was due to the amazingly high death rate of 19.8 per 100,000 in Jackson city.

In 1904, the case rate for smallpox (number of cases per 100,000 of the population) in the rural localities was nearly twice as high as the case rate in urban localities.

The localities which had a much greater number of cases than the case rate for the State as a whole, in 1904, are as follows:

ALCONA COUNTY—Greenbush township; ALLEGAN COUNTY—Salem town-

ship; ALPENA COUNTY—Alpena township, and Long Rapids township; ANTRIM COUNTY—Banks township, Star township, Torch Lake township, Warner township, Bellaire village, and Central Lake village; ARENAC COUNTY—Mason township, Moffitt township, Twining village, and Omer city; BARRY COUNTY—Hope township; BAY COUNTY—Bangor township, Beaver township, Frankenlust township, Frazer township, Garfield township, Gibson township, Kawkawlin township, Monitor township, Mt. Forest township, Pinconning township, Portsmouth township, Williams township, Bay City, and West Bay City; BENZIE COUNTY—Homestead township, Inland township, Platte township, Weldon township and Frankfort village; BERRIEN COUNTY—Watervliet village; CALHOUN COUNTY—Athens township, Newton township, and Athens village; CHARLEVOIX COUNTY—Boyne Valley township, Chandler township, Eveline township, Hayes township, Hudson township, Melrose township, Peaine township, South Arm township, and Boyne Falls village; CHEBOYGAN COUNTY—Burt township, Forest township, Inverness township, Nunda township, Wilmot township and Cheboygan city; CLARE COUNTY—Lincoln township, Redding township and Farwell village; CRAWFORD COUNTY—Frederic township and Maple Forest township; EATON COUNTY—Eaton township, Kalamo township, and Windsor township; EMMET COUNTY—Bear Creek township, Cross Village township, West Traverse township, and Harbor Springs village; GENESEE COUNTY—Fenton township, Forest township, Richfield township, Thetford township, Vienna township, Clio village, and Linden village; GLADWIN COUNTY—Bently township, Butman township, Clement township, Gladwin township, Sage township, Sherman township, and Tobacco township; GRAND TRAVERSE COUNTY—Fife Lake township, Green Lake township, Long Lake township, Mayfield township, Paradise township, Kingsley village, and Traverse City; GRATIOT COUNTY—Bethany township; HILLSDALE COUNTY—Camden township, Ransom township, Wright township, and North Adams village; HURON COUNTY—Caseville township, and Harbor Beach village; INGHAM COUNTY—Aurelius township; IONIA COUNTY—Boston township, and Campbell township; ISABELLA COUNTY—Chippewa township, Coe township, Coldwater township, Deerfield township, Denver township, and Union township; JACKSON COUNTY—Rives township, and Tompkins township; KALAMAZOO COUNTY—Richland township; KALKASKA COUNTY—Excelsior township, Garfield township, Orange township, Rapid River township, and Kalkaska village; KENT COUNTY—Algoma township, Cannon township, Nelson township, Solon township, and Cedar Springs village; LAKE COUNTY—Ellsworth township; Lapeer County—Burnside township, Marathon township, Oregon township, and Columbiaville village; LEELANAU COUNTY—Leelanau township, and Sutton's Bay township; LUCE COUNTY—Pentland township; MACKINAC COUNTY—St. Ignace township and city; MANISTEE COUNTY—Cleon township; MASON COUNTY—Amber township, Pere Marquette township, and Summit township; MECOSTA COUNTY—Big Rapids township, Deerfield township, Fork township, Green township, Millbrook township, Sheridan township, and Big Rapids city; MIDLAND COUNTY—Homer township, Ingersoll township, Lee township, and Porter township; MISSAUKEE COUNTY—Bloomfield township, Butterfield township, Caldwell township, Forest township, Lake township, Reeder township, Lake City village, and McBain village; MONROE COUNTY—London township, Milan township, and Summerfield township; MONTGOMERY COUNTY—

COUNTY—Belvidere township, Cato township, Day township, Reynolds township, Edmore village, Howard City village, Pierson village, and Stanton city; MONTMORENCY COUNTY—Albert township, Briley township, and Rust township; MUSKEGON COUNTY—Moorland township, and Norton township; NEWAYGO COUNTY—Croton township, Denver township, and Everett township; OCEANA COUNTY—Greenwood township, and Pentwater village; OGEMAW COUNTY—Churchill township, Cumming township, Edwards township, Logan township, Richland township, and West Branch township and village; OSCEOLA COUNTY—Evart township, Hartwick township, Highland township, Marion township, Orient township, Rose Lake township, Sherman township, Sylvan township, and Evart village; OSCODA COUNTY—Elmer township; OTSEGO COUNTY—Bagley township, Charlton township, Corwith township, Dover township, Elmira township, and Vanderbilt village; OTTAWA COUNTY—Holland township, Spring Lake township, and Grand Haven city; ROSCOMMON COUNTY—Nester township, and Richfield township; SAGINAW COUNTY—Birch Run township, Blumfield township, Brady township, Brandt township, and Tittabawassee township; SANILAC COUNTY—Austin township, Forster township, Lexington township, Marlette township, Moore township, Speaker township, Washington township, Marlette village, and Minden City village; SCHOOLCRAFT COUNTY—Hiawatha township; SHIAWASSEE COUNTY—Owosso township, Rush township, Corunna City, and Owosso city; ST. CLAIR COUNTY—Grant township, and Yale village; ST. JOSEPH COUNTY—Colon township, and Mendon township and village; TUSCOLA COUNTY—Almer township, Columbia township, Denmark township, Fremont township, Gilford township, Indian Fields township, Koylton township, Tuscola township, and Wells township; VAN BUREN COUNTY—Hamilton township, and Decatur village; WASHITENAW COUNTY—Augusta township, and Milan village; WAYNE COUNTY—Monguagon township; WEXFORD COUNTY—Clam Lake township, Wexford township, and Manton village.

TABLE 93.—*The prevalence of smallpox in urban and rural localities in Michigan, in 1904.*

Localities,—grouped according to density of population.	Population.	Health jurisdictions.	Infected localities.		Cases.	Deaths.	Death rates per 100,000 of the population
			Number of.	Per cent of health jurisdictions.			
Cities over 50,000.....	413,309	2	2	100	93	1	.2
Cities from 25,000 to 50,000	129,336	4	4	100	536	7	5.4
Cities from 10,000 to 25,000, and Calumet township, (17,150).....	266,888	19	13	68	478	2	.7
Cities and village from 5,000 to 10,000	133,870	21	15	71	284	2	1.4
Cities and villages under 5,000.....	307,332	367	107	29	836	3	.8
Total urban	1,346,735	413	141	34	2,227	15	1.1
Rural (townships*)	1,183,281	1,217	399	33	3,526	9	.8

*Not including Calumet, which, for the purpose of this study, is classed with urban localities having corresponding populations.

THE SEASONAL PREVALENCE OF SMALLPOX.

Table 94 indicates that smallpox is most prevalent during the months of November to June, both inclusive, the maximum number of cases occurring in the month of March, and the minimum in September.

TABLE 94.—*The seasonal prevalence of smallpox, as indicated by the average numbers of persons taken sick in each month in the five years, 1900-1904.*

Months.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases taken sick.....	528	516	536	510	494	357	233	137	117	175	348	470

THE REPORTED SOURCES OF CONTAGIUM OF SMALLPOX.

Table 95 indicates that in but 46 per cent of the whole number of cases which occurred during the eleven years, 1894-1904, was the source of the contagium located, and reported to this Department. It will be seen that about 57 per cent of the cases in which a source was reported were due to the movement, from one locality to another, of persons suffering from or who had been exposed to smallpox. In very many instances the disease was so mild that the patients did not call in a physician or take to their beds, and in this way many of them were enabled to move about from place to place without let or hindrance on the part of the local health officials.

TABLE 95.—*The reported sources of contagium in smallpox, in the eleven years, 1894-1904.*

Reported sources.	Number of instances.
Traced to a former case.....	4,890
Probably traced to a former case.....	7
Traced to outside jurisdictions.....	6,688
Probably from outside jurisdictions.....	181
Infected houses, articles, clothing, etc.....	50
Immigrants.....	1
Number of cases in which a source of contagium was reported.....	11,817
Source reported as unknown.....	10,851
Source not stated or statements doubtful*.....	2,980
Total number of cases in the 11 years, 1894-1904.....	25,653

*In each year, many cases in this group belonged to outbreaks which began in a preceding year, and the source of contagium may have been traced and reported when the outbreak first began.

REPORTED PERIODS OF INCUBATION IN SMALLPOX.

The incubation periods in smallpox for 1904 were not compiled, because the figures shown in Table 96 correspond very closely with the observations made by Dr. Vacher, and other observers along this line, and are believed to be sufficient for the purposes of this compilation. The table indicates that, in a majority of instances, the greatest number of cases were taken sick on the fourteenth day, and that the range is from seven to twenty-one days.

TABLE 96.—*Reported periods of incubation in smallpox, 1895–1896 and 1900–1903.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11
Instances in each day.....	2	3	9	7	3	5	43	17	63	114	18
Incubation period—days.....	12	13	14	15	16	17	18	19	20	21	22
Instances in each day.....	122	51	415	49	44	13	34	12	18	37	4
Incubation period—days.....	23	24	25	26	27	28	29	30	34	60	
Instances in each day.....	6	1	1	2	1	3	2	2	1	1	

THE INFLUENCE OF AGE IN SMALLPOX.

Table 97 indicates that smallpox is most prevalent among those of from 5 to 29 years of age, particularly in those of from 15 to 24 years.

The greatest fatality in smallpox in the eight years, shown in Table 97, occurred in children under one year old, and the next greatest in persons of from 20 to 24 years. From the table it would appear that the ages at which smallpox is most fatal are from 15 to 39 years.

By reason of the small number of deaths included in Table 97, too much dependence should not be placed upon the figures therein, because a larger number of deaths might change the ages of greatest sickness and mortality from smallpox.

TABLE 97.—*The influence of age in smallpox, as indicated by the numbers taken sick and those who died from this disease in the eight years, 1894-1897 and 1900-1903.*

Age periods.	All cases.		Fatal cases.	
	Numbers,	Per cent of all cases, known ages.	Numbers,	Per cent of all deaths, known ages.
Under 1 year.....	170	1.5	31	20.8
1 year.....	207	1.8	3	2.0
2 years.....	246	2.2	7	4.7
3 years.....	248	2.2	3	2.0
4 years.....	275	2.4	2	1.3
5-9 years.....	1,502	13.2	2	1.3
10-14 years.....	1,410	12.4	3	2.0
15-19 years.....	1,592	14.0	13	8.7
20-24 years.....	1,679	14.8	18	12.1
25-29 years.....	1,158	10.2	13	8.7
30-34 years.....	778	6.8	13	8.7
35-39 years.....	583	5.1	11	7.4
40-44 years.....	499	4.4	6	4.0
45-49 years.....	384	3.4	6	4.0
50-54 years.....	240	2.1	0	0
55-59 years.....	150	1.3	2	1.3
60 and over.....	240	2.1	16	10.7
All ages.....	11,361	100.0	149	100.0

VACCINATION OF SICK AND EXPOSED PERSONS, IN OUTBREAKS OF SMALLPOX, IN 1904.

Table 98 indicates that of all the persons sick with smallpox in 1904, but seven per cent had ever been vaccinated.* The table also indicates that in thirty per cent of the outbreaks of smallpox in 1904, the persons who had been exposed to the disease were vaccinated; that in forty-five per cent of the outbreaks, unvaccinated persons who had been exposed to smallpox were isolated, for periods shown in Table 101; that in forty per cent of the outbreaks, general vaccination was recommended; that in twenty-eight per cent of the outbreaks free vaccination was offered; and that in eleven per cent of the outbreaks, vaccination and revaccination were general.

In reply to the question, "How many who died were ever vaccinated?" no cases were reported.

*The times of vaccination of these persons are shown in Table 99.

TABLE 98.—*Vaccination and revaccination of sick, exposed and other persons, in 1904.*

Number of persons vaccinated prior to sickness.....	{ Yes..... No..... Unknown.....	427 2,949 2,377
Number of outbreaks in which exposed persons were vaccinated.....	{ Yes..... No..... Unknown.....	217 275 222
Number of outbreaks in which exposed persons <i>not</i> vaccinated were isolated.	{ Yes..... No..... Unknown.....	320 129 265
Number of outbreaks in which general vaccination was recommended.....	{ Yes..... No..... Unknown.....	282 263 169
Number of outbreaks in which free vaccination was offered.....	{ Yes..... No..... Unknown.....	201 358 155
Number of outbreaks in which vaccination and revaccination was general.	{ Yes..... No..... Unknown.....	76 445 193

THE EFFICACY OF VACCINATION.

As possibly indicating the efficacy of vaccination in the prevention of smallpox, Table 99 has been prepared. It will be seen that of the 230 persons included in the table, the date of whose vaccination was definitely reported, about five per cent had been vaccinated within a month immediately preceding the sickness; fifteen per cent during the same year as the occurrence of the sickness; and seventy-four per cent at some time within the five years immediately preceding the sickness. In view of the general belief that vaccination once in every five years is a preventive against smallpox, the table should have indicated the greatest number of cases as having been vaccinated more than five years prior to the sickness. It is believed that a continuation of this table for a number of years will present a different result from that shown in Table 99.

TABLE 99.—*The time which elapsed between previous vaccination, and sickness of smallpox patients, in 1904.**

Time.....	3 days.	5 days.	7 days.	10 days.	21 days.	30 days.	Same year.	1 year.	2 years.	3 years.	4 years
Number of cases.....	1	1	5	2	1	1	23	2	60	26	27
Time.....	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	12 years.	15 years.	20 years.	21 years.	25 years.
Number of cases.....	22	3	3	3	1	4	1	4	24	1	3
Time.....	30 years.	40 years.	45 years.	50 years.	53 years.	55 years.					
Number of case.....	3	3	1	3	1	1					

*There were 197 cases, not included in this table, which had been vaccinated prior to the sickness from smallpox, but in which the time of vaccination was indefinite or not stated.

THE VACCINATION OF PERSONS EXPOSED TO SMALLPOX IN 1904.

Table 100 indicates that, in many outbreaks of smallpox in 1904, there was considerable delay in the vaccination of those persons known to have been exposed to smallpox, fourteen to twenty-one days having elapsed, in a large number of instances, between the exposure and vaccination.

TABLE 100.—*The number of days which elapsed between exposure and vaccination of exposed persons, in outbreaks of smallpox, in 1904.**

Number of days intervening.....	Same day.	1	2	3	6	8	9	10	12	14	15
Number of outbreaks.....	11	6	5	3	1	2	2	8	3	31	18
Number of days intervening.....	16	17	18	19	20	21	22	23	24	25	27
Number of outbreaks.....	36	4	12	1	17	35	1	3	2	1	2
Number of days intervening.....	30	31	32	33	34	35	36	37	38	40	42
Number of outbreaks.....	8	2	3	1	3	1	2	2	1	3	2
Number of days intervening.....	43	45	47	49	50	56	69	90			
Number of outbreaks.....	1	2	1	1	1	1	1	1			

*There were 36 outbreaks, not included in this table, in which the number of days was given, but not definitely, as, 1 to 10 days; 10 to 16 days, etc.

ISOLATION OF UNVACCINATED PERSONS WHO WERE EXPOSED TO SMALLPOX IN 1904.

Table 101 indicates that, of the 324 unvaccinated persons exposed to smallpox in 1904, about 15 per cent were isolated for a period of fourteen days, and about 65 per cent for from fourteen to twenty-one days, both inclusive. This action is commended, because those persons who are known to have been exposed to smallpox, and who have not been and will not be vaccinated, should be disinfected and kept under strict surveillance, by the health officer, during the usual period of incubation, and thus prevent them from becoming new centers of infection.

TABLE 101.—*The time during which unvaccinated persons, exposed to smallpox, in 1904, were isolated.*

Number of days isolated.....	2	5	6	8	9	10	12	13	14	15	16
Instances in each period of days.....	1	1	1	3	2	10	3	1	50	21	49
Number of days isolated.....	17	18	19	20	21	22	23	24	25	27	28
Instances in each period of days.....	6	14	1	22	47	2	4	2	2	2	4
Number of days isolated.....	30	31	32	33	34	35	36	37	38	39	40
Instances in each period of days.....	10	2	4	1	2	5	2	2	3	1	5
Number of days isolated.....	42	43	44	45	47	49	50	56	60	69	90
Instances in each period of days.....	5	1	1	2	1	1	1	2	1	1	1
Number of days isolated.....	5-10	8-10	9-12	10-12	10-14	12-19	14-20	14-21	15-21	16-20	18-20
Instances in each period of days.....	1	1	1	2	1	1	1	2	2	3	1
Number of days isolated.....	21-25	21-40	21-28	16-21	16-37	20-60					
Instances in each period of days.....	1	1	1	1	1	1					

ISOLATION OF SICK PERSONS, AND DISINFECTION OF INFECTED PREMISES IN OUTBREAKS OF SMALLPOX, IN 1904.

Table 102 indicates that in but slightly more than 31 per cent of all the outbreaks of smallpox in 1904, were the restrictive measures of isolation and disinfection properly enforced. As in the case of other diseases, considered in this article, the principal obstacle to the completeness of the restrictive measures was the lack of sufficient disinfectant in the final disinfection of the premises.

In this connection it may be stated that, in 1904, smallpox was reported in 764 households at the beginning and in 1,836 at the close, of the outbreaks in that year.

TABLE 102.—*Isolation of sick persons, and disinfection of infected premises, in outbreaks of smallpox in Michigan, in 1904.*

Isolation and disinfection.	Number of outbreaks.	Per cent of all outbreaks.
Both enforced.....	209	31.7
Isolation and disinfection not mentioned in the reports, or statements doubtful.....	451	68.3
All outbreaks*.....	660	100.0

*There were 104 outbreaks which began in a preceding year, or were continued into 1905, which cannot be included in this table, because the extent of the restrictive measures is not definitely known.

During the year 1904, the State Inspector of Dangerous Communicable Diseases has been called upon to investigate seventeen outbreaks of smallpox, where it was alleged that nothing was being done for the restriction of the disease, or where there was a dispute in the diagnosis, and in each instance it proved to be the usual mild form of smallpox. In six of the instances the conditions were such as would warrant the expenses being paid by the State. In the other eleven instances the expense was paid by the locality asking for the investigation.

The mild form of the disease still continues, and has greatly retarded both State and local work for its restriction and prevention.

At the close of the year 1904, smallpox was reported as then present at 61 places, in 31 counties, being the same number of places (but in two counties more) as at the close of the preceding year.

ERYSIPelas AND PUERPERAL FEVER IN MICHIGAN IN 1904.

During the year 1904, there were reported to this Department sixty-four cases, including seven deaths, from erysipelas; and nine cases, including five deaths, from puerperal fever.

In four outbreaks, the cases of erysipelas were reported as facial erysipelas.

The following letters, relative to the intimate connection between these two diseases, may be of interest:

"You will see by the notification herewith forwarded that, since I wrote you, a case of puerperal infection has developed, which can be traced directly, and without the possibility of doubt, to the case of facial erysipelas. Acting upon your recommendation, I will henceforth act in such cases exactly in the same manner as in cases of other communicable diseases."

"The case of puerperal fever I commenced attending on October 20, and she was still under treatment when her father (living in a separate house), about Nov. 20, picked a small pimple on his ankle with his finger nail—a severe case of erysipelas resulting."

Relative to the outbreak, mentioned in the preceding paragraph, another physician writes:

"The erysipelas and puerperal fever were in different households. The case of erysipelas was taken sick December 12, 1904. Puerperal fever was taken sick about December 5, 1904. I treated both cases, but did not take care of the puerperal case at confinement, which occurred about the week previous."

In the annual report of this Department for the year 1879, an article was published concerning these two diseases which endeavored to establish their relation. In it several cases of erysipelas were cited as having been reported from various parts of the State nearly synchronous with cases of puerperal fever occurring in the same localities, and the danger of a physician attending any cases of confinement, or any women during the puerperal period, while he is in attendance upon an erysipelas or puerperal fever case, was strongly emphasized.

TETANUS IN MICHIGAN IN 1904.

During the year ending December 31, 1904, there were reported to the Secretary of the State Board of Health, twenty-one cases, including eighteen deaths, from tetanus, in Michigan.

Of the twenty-one cases reported, two fatal cases were from the use of toy pistols; two cases, one of which terminated fatally, following vaccination; two fatal cases from revolver or shotgun; one fatal case from gunpowder explosion, in blasting stumps; one fatal case by a cut from rock or being thrown from rig; one fatal case from a wooden splinter; one fatal case from a kick by a horse; two fatal cases, traumatic; one fatal case from stepping on a pin; two fatal cases from hands caught in machinery; and six cases, four of which terminated fatally, from rusty nails.

In 1904, the average age of cases of tetanus was 22.9 years; the average period of incubation—dating from the day of injury to the day the disease was recognized—was 3.5 days; and the average duration—dating from the day the disease was recognized, until the time of death—was about 7.6 days. Three of the cases were not reported as having recovered, but as improving.

Relative to the death from tetanus, following vaccination, T. B. Cooley, M. D., health officer of Ann Arbor city, wrote:

"You will probably see by the papers that we have a death here from tetanus, following vaccination. It seems to have been purely a matter of neglect, on the part of the boy's family, of an ulceration following a proper enough vaccination. There was a deep ulceration over a space nearly two inches in diameter, and a half or three-quarters of an inch deep, but the dressing applied by the physician who did the vaccination three weeks before, had not been removed, nor had they paid the slightest attention to the child. He seems to have had well marked trismus for two days before a physician was called."

Ten days later, the health officer again wrote to this office, relative to the above case of tetanus following vaccination:

"I have asked my assistant to see what he can do toward following up the tetanus case. While I am a great believer in vaccination, and have been having very fair results with the vaccine I am using, I must say that I have seen, or heard, of a surprisingly large number of unduly sore arms, with ulceration, etc., for which I am rather at a loss to account, knowing with what care the virus is tested. I am prepared to give negligence, both on the part of the physicians and laity, its full credit, but it doesn't seem to account for everything. While I haven't any idea that in this tetanus case the bacilli were present in the virus, I have a vague suspicion that perhaps the deep ulceration in the arm, which gave these a chance to develop, may have been due to something in the vaccine that shouldn't have been there."

CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1904.

During the year ending December 31, 1904, there were reported to this Department, seventy-one outbreaks of chicken-pox, which resulted in 519 cases, including one death.

Whenever an outbreak occurs in the State, the following letter is sent to the health officer of that jurisdiction:

"I am informed that chicken-pox is present in your jurisdiction.

"Many times smallpox has been diagnosed as chicken-pox, and not infrequently physicians have insisted that cases of smallpox were chicken-pox. There has long been trouble of this kind, but the mildness of smallpox recently has made this error more common than formerly.

"By this mail I send you copies of the pamphlet issued by this Board, 'Vaccination and Revaccination.—The Prevention of Smallpox,' and because smallpox is so often diagnosed as chicken-pox, all persons exposed to such a disease should be vaccinated; it is a reasonable precaution, and the public health interests should be given the benefit of every doubt.

"Children having chicken-pox should not be allowed to attend school; they should be promptly isolated until it is proved beyond a doubt that it is not smallpox.

"It should be remembered that adults seldom have chicken-pox, therefore an eruption, especially a papular eruption, becoming vesicular, occurring in a person over ten or twelve years of age, should be regarded as probable smallpox, and the same precautions should be taken as in cases of recognized smallpox, until some competent authority has decided that it is not smallpox.

"This Board has not yet issued a printed leaflet relative to chicken-pox, but because of the above-mentioned reasons it is recommended that every case of chicken-pox be reported to the local health officer, and that prompt action be taken by him to restrict the disease, and to report the facts to the Secretary of the State Board of Health."

DYSENTERY IN MICHIGAN IN 1904.

Relative to cases of dysentery reported on the postal-card reports, by the health officer of the Village of Applegate, Sanilac county, the Secretary of this Board wrote:

"By your postal card reports of November 19 and of November 26, two cases and eight cases of dysentery, respectively, are reported. This outbreak of dysentery appears to be an epidemic, and I shall be very glad to receive from you all of the information you can accommodate me with. Since dysentery is sometimes accompanied by the presence of the living unicellular organism, ameba, in the intestine, it is desired to learn whether it is *always* dependent upon the presence of that organism, also the facts relative to the source of drinking water used by persons sick with dysentery. Among other facts, the answers to the following questions are of importance:

"Are all these cases confined to one community?

"What is the number of cases? Of deaths?

"Describe source of drinking water in each case. Is it from a well, cistern, or tank, or general supply for the village? Can you find any decomposing vegetable material adhering to well, cistern or tank? At least some varieties of ameba have been found in the water in which there was straw. It seems important to investigate each case with reference to such possible source of ameba in the drinking water, as, for instance, straw packed around hydrants which alternately waste to and take in water from their surroundings. To the investigation of the cause of dysentery, it will be of value to have samples collected in the following manner: Submerge the sterilized bottle in the cistern or well water just beneath any scum which may have formed about the vegetation adhering to the sides of the reservoir; cork the bottle tight, label it and send to the office.

"Have there been microscopic examinations made of the discharges from the persons sick with dysentery? Have ameba been found to be present? How have the discharges disposed of?

"Enclosed herewith is a copy of a pamphlet, issued by this Board, on the prevention of typhoid fever, and I think that about the same precautions should be taken in cases of dysentery. I would recommend the boiling of all drinking water from a suspected source."

In reply to this letter, the Health Officer wrote:

"Yours requesting information regarding cases of dysentery received.

"The cases occurred in two families residing about twelve miles apart. Five cases in one family—a father, mother and three children. The parents had very light attack, while quite severe in children—marked ulceration of rectum and protrusion of same on each straining effort.

"In the other family three children were afflicted. The cases all occurred within a week, one after another coming down. They ran a short course—a week to ten days.

"Both are well to do families, good hygienic conditions and wholesome food. I examined the water supply particularly—each having a good pipe well and no decaying animal matter in same—no microscopic examination made. I had children drink scalded milk and boiled water. Took usual precautions with bowel discharges."

**DISEASES OF ANIMALS, DANGEROUS TO MAN, IN MICHIGAN
IN 1904.**

Whenever information is received at this office of the occurrence of an outbreak of any disease of animals, which, by reason of its communicability, may be considered dangerous to man, efforts are made to learn all facts relative to such outbreaks. The matter is reported to the State Live Stock Sanitary Commission, and the attention of the health officials of the locality where the disease is reported present is called to the fact of its reported prevalence, and they are requested to take immediate measures for the prevention of its spread, by establishing and maintaining quarantine over the diseased animals, until relieved by the State Live Stock Sanitary Commission.

During the year 1904, outbreaks of actinomycosis (lumpy-jaw) and other diseases among cattle, glanders (farcy) in horses, disease among hogs, and rabies (hydrophobia), were reported to this office from various parts of the State, a brief history of the most important of which follows:

ACTINOMYCOSIS (LUMPY-JAW) IN MICHIGAN IN 1904.

During the year 1904, information relative to four outbreaks of actinomycosis (lumpy-jaw) in cattle, in Michigan, were received at this office.

Letters received, relative to two of these cases, which were not being cared for, expressed great fear that their calves might be sent to the butchers. Prompt letters, sent from this Department, to the health officers of these jurisdictions, in all probability, prevented this action.

"TREMBLES"—"MILK SICKNESS."

In November, 1904, a duplicate copy of a certificate of death, from "Milk sickness," was received at this office from the Division of Vital Statistics, and the Secretary of this Department wrote the attending physician for full information relative to the case. The following interesting letter was received:

"Replying to yours of yesterday (Nov. 5, '04) will say the death of Mr. —— was due to toxemia of 'Milk sickness,' result of drinking milk, and using the butter from a cow suffering from 'Trembles.' The term 'Milk fever' is a misnomer, as none of the cases ever have fever, in fact, a sub-normal temperature is one of the diagnostic symptoms. My personal experience covers a period of eighteen years, during which time there has been sporadic or isolated cases,

almost every autumn, and as it occurs only in the vicinity of the St. Joseph river, on the bottom lands of which all the sick cattle have been pastured, we have naturally looked there for the special poisonous plant.

"In the autumn of 1896, Prof. Wheeler, of the Agricultural College, Lansing, was sent here to investigate this matter; he remained over one day, taking home with him an assortment of shrubs, plants and fungi. What the results of his investigation were I have never known. At this time I sent a specimen of urine voided by a Mr. _____ to the Physiological laboratory of the State University, but for some reason I can't recall having received any information. I then made an endeavor, through the Agricultural departments and Health Boards of several states, to obtain some information, but failed to obtain anything of value; however, I did receive the kindest consideration from all of them. It has seemed to me some definite effort should be made to prevent this disease, as the effect of this poison is severe, and, I believe, far-reaching, and may occasion great suffering whenever the milk products are used either in cheese, cream or butter."

UNUSUAL DISEASES AMONG CATTLE IN MICHIGAN IN 1904.

A letter was received at this office from Bessemer City, Gogebic county, relative to a disease among cattle in that jurisdiction. Extracts from this correspondence give details relative to the occurrence:

"Can you give me any information as to the treatment for cows which are affected as follows:

"While in apparent good health, one or both eyes suddenly become considerably enlarged and water runs from one or both eyes continuously, followed by a white film forming over the eye, which results in total blindness of the eye or eyes affected. They give but little milk after being taken sick and seem to be in great pain.

"Any information you can give me as to the cause and name of this trouble and the proper treatment for same will be greatly appreciated."

In reply to this letter, the Secretary advised to discontinue the use of milk from the diseased animals, also to quarantine them pending an investigation by the State Live Stock Sanitary Commission.

A letter from William F. Breakey, M. D., of the University Hospital, Ann Arbor, was received at this office relative to a parasitic disease among cattle, which is as follows:

"I write to ask what you can tell me about a parasitic disease of skin and hair of horned cattle reported to be quite prevalent in some counties in Michigan and perhaps in other states.

"I have had some patients,—Hospital and private—men infected from handling cattle, and where the cause has been overlooked and condition neglected until extensive induration of neck, nodules and abscesses of bearded face and burrowing sinuses. Causing much distress and stubborn and tedious because of the difficulty of getting a parasiticide into the deep tissues and hair follicles where the germ persists.

"Two of these cases were quite severe, more so than the ordinary sycosisbarbae.

"I have written the State Veterinary Board asking what they know about it and if they do anything or advise anything. It seems a proper subject for Public Health Functionaries to consider."

In reply to this letter, the secretary wrote:

"I do not recall that any reports have been made to this office on the disease of cattle mentioned in your letter. I am very glad to have your report on the subject, and shall be glad to investigate the subject more fully if an opportunity is afforded. Also to have any report you may be able to make on the subject."

GLANDERS (FARCY) IN HORSES IN MICHIGAN IN 1904.

During the year ending December 31, 1904, there were reported to this Department, four outbreaks of glanders in horses, in four localities in Michigan.

Relative to one outbreak of glanders, the health officer of a township writes:

"I have run against a snag. Please help me out. I have had a case reported, said to be glanders. Our veterinarian is a young man, and has had no experience in the disease, and, although he has twice examined the horse, declines to say positively that it is glanders. I think he is inclined to the belief that it is. I have the animal quarantined. Now will you please inform me what the duty of the health officer is in such cases, and how should be proceed? Who is the State Veterinarian, and where does he reside? An early answer will be highly appreciated."

In reply to this letter, the Secretary of this Board wrote:

"Your letter of August 29 relative to a suspected case of glanders is before me. Glanders is a dangerous communicable disease, dangerous to man as well as to animals, and it is your duty as health officer to take proper measures to restrict the spread of the disease until relieved by the State Live Stock Sanitary Commission. I will at once notify the President of said Commission, Hon. Henry H. Hinds, Stanton, Mich., who will either personally visit your place or authorize some other member of the Commission to do so, to take charge of the case."

DISEASE AMONG HOGS IN MICHIGAN IN 1904.

During the year 1904, a letter was received at this office relative to disease among hogs in Rapid River, Masonville township, Sanilac county, which reads as follows:

"There is a long lingering disease among hogs and pigs in this section of the country; will try and give you an outline as to how it acts on them, as near as possible, namely, they seem to stand around wheezing and hard for them to get a breath; they seem to fail very fast, feet rotting away as well as other parts decaying. At times they seem to eat and get around, but linger around and die. The writer has killed several of his own and the other day I killed two for my meat market; found their lungs about gone and some red spots on body, so will not use them at all. I have lost six and killed three myself to get them out of misery. I have reported same to our local health officer here and he advised me to take the matter up with you to see what could be done in the matter. We would ask you to kindly give this matter your early attention as something must be done as, in my estimation, the hogs in this section are

all affected more or less, so something must be done to stamp out the disease at once."

Relative to the above, the Secretary wrote that it was a subject under the jurisdiction of the State Live Stock Sanitary Commission and stated that a copy of the letter had been transmitted to a member of that Commission, requesting that he give the subject proper attention.

RABIES IN MICHIGAN IN 1904.

During the year 1904, there were reported to this Department, six outbreaks of rabies, in animals, in six localities in Michigan, resulting in thirty-eight or more cases. One outbreak was reported to be among cattle, and five outbreaks as having been caused by dogs. One boy was bitten by a dog, supposed to be rabid, and was immediately taken to the Pasteur Institute at Ann Arbor. Two men were thought to be inoculated by caring for the sick cattle, and skinning them after death. They were sent to Ann Arbor for treatment.

The following general instructions have been sent to health officers, and other interested persons, in localities where rabies was reported present:

MUZZLE ALL DOGS AT LARGE.

The State Board of Health advises every local board of health in Michigan to immediately make and publish regulations ordering the muzzling of all dogs at large and the killing of all unmuzzled dogs found at large, and to make provision for the prompt and effective execution of such regulations.

Local boards of health have full power to make such regulations which, when published, have the force of law, the violation of which is a misdemeanor. This power or authority is implied, and is also given by statute in Michigan, in townships by Sections 4412 and 4413, Compiled Laws of Michigan, 1897; and these sections are made to apply in cities and villages by Sec. 4459, excepting in cases where the charters of such cities and villages contain provisions inconsistent therewith.

The section of law specifying the manner of the publication is as follows:

"Sec. 4416. Notice shall be given by the board of health of all regulations made by them, by publishing the same in some newspaper of the township, if there be one published therein, and if not, then by posting them up in five public places in such township; and such notice of said regulations shall be deemed legal notice to all persons."

The following form is recommended:

OFFICIAL PUBLIC NOTICE BY THE BOARD OF HEALTH. REGULATIONS FOR THE PREVENTION OF HYDROPHOBIA, BY THE RESTRICTION OF RABIES.

WHEREAS, rabies is widely disseminated and is epidemic in Michigan; and WHEREAS, the State Board of Health has recommended that municipal and township authorities order the muzzling of all dogs at large, and make and publish regulations to that effect;

Resolved, That the local board of health of the township [city or village] of county of State of Michigan, hereby makes and publishes the following regulation:

All dogs, male or female, not effectually muzzled, running at large on any street, alley or public grounds, or private premises, not the premises of the owner or keeper thereof, may be killed by any person; and it shall be the duty of every constable [policeman, or other peace officer] of the said township [city, or village] and he is hereby ordered to kill any and all such dogs.

[Name of place and date.]

Attest.

..... Clerk of the Board of Health.

MAD DOGS.—WHAT TO DO WITH AN ANIMAL SUPPOSED TO BE RABID.

If it is certain that the supposed rabid animal has not bitten any person or animal, it may properly be killed and buried where no other animal may gain access to it.

Whenever a person has been bitten by a dog which there is reason to believe is infected with rabies, or a part of his body of which the skin is in any way broken is brought in contact with saliva from such dog, he or she should promptly go or be sent to a Pasteur Institute for treatment until it is determined whether or not the dog was so infected.

When an animal has been bitten by a dog supposed to be rabid (commonly said to be "mad" or to have "hydrophobia"), it is desirable, and when a person has been so bitten it is important that the fact be established whether or not the dog is rabid. Because, if it is known to be rabid, there may then be time for the person bitten to undergo preventive inoculation or other treatment; while if the dog is proved not to have had rabies such trouble may be prevented, as also the extremely painful anxiety which otherwise would long continue. It is now possible to learn whether or not an animal is rabid.

If practicable, without danger of some person being bitten, the dog or other animal supposed to have rabies should not be killed, but be very securely confined, in such manner that it is not possible for it to bite any person or animal. *If the dog is rabid it will die within eight days.* If it does not, it is proof that it was not rabid. If it dies, the animal was probably rabid, and in that event, as also if the animal has been killed, the upper portion of the spinal cord and adjacent part of brain should be placed in a sterilized bottle with a glass stopper, the bottle then filled with twenty per cent solution of pure glycerine, and the whole sent by express or special messenger to the Director of the State Laboratory of Hygiene, Ann Arbor, with request for an immediate biological test for rabies, and a report of the result. Such investigations are made there at cost.

A person bitten by an animal supposed to be rabid should very promptly consult a physician; and without waiting for the physician should employ all practicable means for dislodging from the wound any germs of virus which may have entered there; washing the wound freely with boiled water, and by means of a syringe if possible.

Rabies is a "disease dangerous to the public health" and as such should be promptly reported to the health officer, and promptly restricted by him in accordance with Act 137, Laws of 1883, and other laws relating to the public health. If the disease occurs in an animal, the health officer or local board should also, in compliance with Sections 5 and 6, Act No. 125, Laws of 1889 (C. L. 1897, Sections 5631 and 5632), promptly

report the fact to the State Live Stock Commission,—the guardians of the safety of animals; but under no circumstances should the local health authorities fail to guard the public health and life from this fearful disease.

Animals bitten by a supposed rabid dog should be promptly isolated by the local board of health and kept thus until the State Live Stock Commission shall have been informed of the facts and takes charge of the animal or animals, thereby relieving the local board of health. This is required by Section 6, Act 125. Laws of 1889 (Section 5632, C. L. 1897). Whether in man or animal, the disease should be promptly reported to the State Board of Health.

NUISANCES IN MICHIGAN IN 1904.

During the year 1904, communications relative to ninety alleged nuisances in Michigan were received at the office of the State Board of Health.

The causes to which the alleged 'nuisances in these communications were attributed, may be classified as follows: Insanitary conditions in or about streets, houses, public buildings, barns, barnyards, stock-yards, pig pens, stables, etc., 33; privy vaults, cesspools, sewers, 21; refuse from factories, cider mills, and sugar beet factories, 6; slaughtering and slaughter houses, 11; insufficient buried animals, 13; insanitary conditions of ponds, lakes, etc., and ice, 6.

Letters relative to these alleged nuisances were received at this office from eighty-six health jurisdictions;—nineteen from cities; thirty-nine from villages, and twenty-eight from townships.

The fact that the greatest number of complaints of nuisances came from villages, and the least number of complaints from cities, might be taken as an indication that, in cities, greater attention is paid to the sanitary requirements of the localities, in the matter of sewerage, drainage and water supplies.

One of the letters, relative to the insanitary conditions of water in wells which is alleged to have been the cause of an outbreak of typhoid fever, is as follows:

"There exists in my township a serious problem, and I want to put before the State Board and see if there is any remedy. Some time ago a man by the name of Swan, owning land on Grosse Isle, Wayne county, put down a 14-inch hole in the earth some 2,800 feet down. Now that well has a flow of water that has drained seven-tenths of all the wells in my township and in consequence those seven-tenths are using water from wells that is not fit for any use and is poorer than poor surface water, watering stock, milch cows and a goodly number sell milk that goes into the city of Detroit. It seems to me that wells that water has to be scooped up from the bottom of such wells is not fit for use, and at present we have more or less summer complaints and in some and in fact many cases a low type of fever and am serions that it will develop in something worse, if things are not remedied in some way. You will see a high death rate here in southern Michigan. The farmers are doing the best they can under the circumstances. I have given orders that all water used in households be boiled. It seems to me and others that there is or would be some way

to cause this man to shut off at least part of his flow of water that does no one any good not even himself, only to see it wasted. It seems the well was put down for gas or coal oil and got neither. That well is going to be responsible for a great deal of suffering and a goodly number of deaths. It is a crime for such a thing to exist here in Michigan. Experts tell us that the flow of water at Grosse Isle is the cause of our low water and we think so, for the reason that it never existed before. Cannot the State Board of Health take some action, and an active part and discover some way to remedy the curse and let it be at once. We are living in hope that you will find some way of solution of the problem."

In reply to this communication, the Secretary of this Board wrote:

"Replying to your communication of July 22, the condition mentioned in your letter is one of importance to a large number of residents in your township and should receive prompt attention through its proper jurisdiction. I should advise that you consult with the prosecuting attorney of your county or some other good attorney who will be able to advise you of the proper procedure in the matter. The law gives the circuit court equity jurisdiction in all matters concerning nuisances where there is *not* a 'plain, adequate and complete remedy at law.' I *think* that your local board of health should ask for an injunction from the Wayne Circuit Judge, because the nuisance is alleged to be *caused* in that county, although it exists in Monroe county. A temporary injunction *might* give important evidence as to whether the flow from the pipe is causing the low water in wells."

Reference to this same outbreak is given in the article on typhoid fever, in this report, under the heading, "Why Carleton-Rockwood wells have gone dry explained;" and a law for the regulation of artesian and other wells, is quoted in the first part of this report under the heading, "Public health legislation in Michigan in 1905."

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